VOLUME 17 / NUMBER 18
SEPTEMBER 23, 1979
ACC. NOS. N79-27068 TO N79-28117

STAR
AN ABSTRACT JOURNAL

Scientific and Technical Aerospace Reports

PRODUCED BY THE
SCIENTIFIC AND TECHNICAL
INFORMATION
BRANCH

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WHAT YOU CAN DO FOR *STAR*

All users of this abstract service are urged to forward reports to be considered for announcement in *STAR*. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those that you will transmit to NASA, DoD, or DOE through the usual contract- or grant-reporting channels), please send them for consideration to the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

Reprints of journal articles, book chapters, and conference papers are also welcome. These will be considered for announcement in *STAR's* companion journal, *International Aerospace Abstracts*.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on public sale at the National Technical Information Service. Copyrighted publications will be announced but not distributed or sold.

PURCHASE OF *STAR*

The semimonthly issues and the cumulative index issues are available postpaid on subscription and in single copy from the Superintendent of Documents, United States Government Printing Office, Washington, D.C., 20402, United States of America.

Semimonthly issues...

Annual subscription rates: $60.00 domestic; $75.00 foreign. Price per single copy: $2.50 domestic; $3.15 foreign.

Cumulative index issues, semiannual and annual ...

Annual subscription rates for both: $25.00 domestic; $31.25 foreign. Price per single copy: semiannual $9.50 domestic, $11.90 foreign; annual $16.00 domestic, $20.00 foreign.

Domestic subscription rates...

Apply to the United States, Canada, Mexico, and all Central and South American countries, except as noted below.

Foreign subscription rates...

Apply to Argentina, Brazil, French Guiana, Guyana, Surinam, Belize, and all other countries throughout the world.

Payment should be by check, money order, or document coupons, and must accompany order. Remittances from foreign countries should be made by international money order or draft on an American bank, payable to the Superintendent of Documents, or by UNESCO book coupons.

PUBLISHED BY:

UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION BRANCH
Scientific and Technical Aerospace Reports, Volume 17, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Information Systems Company.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1981.

US ISSN 0036-8741

INTRODUCTION

Scientific and Technical Aerospace Reports (STAR) is a major component of a comprehensive National Aeronautics and Space Administration information system covering aeronautics, space, and supporting disciplines. *STAR* is issued on the 8th and 23rd of each month and announces current publications of the following types:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations in report form
- NASA-owned patents and patent applications
- Dissertations and theses

Cumulative index volumes are published semiannually and annually.

Journal, book, and conference literature, cover-to-cover journal translations, and certain foreign dissertations are announced in a companion journal, *International Aerospace Abstracts (IAA)*, available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

ON-GOING RESEARCH PROJECTS

By arrangement between NASA and the Smithsonian Science Information Exchange (SSIE), a separate section of information on aerospace-related *On-Going Research Projects* is inserted into each issue of *STAR*. The insert presents titles of active NASA grants and university contracts, summary portions of recently updated *NASA Research and Technology Objectives and Plans (RTOPs)*, and notices of non-NASA research projects that were funded in the most recent or current fiscal year. The latter are selected by SSIE. The project announcements in the insert are arranged by *STAR* divisions but are otherwise entirely separate from *STAR*. They are not indexed nor machine-searchable by NASA. Current and retrospective searches are available from SSIE, 1730 M Street, N.W., Washington, D.C. 20036.

SUBJECT SCOPE

Subject scope of *STAR*, *IAA*, and *On-Going Research Projects* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

OTHER NASA PUBLICATIONS

Other NASA publications and information services are described in the publication, *The NASA Scientific and Technical Information System ... and How to Use It*, available without charge from the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

HOW TO USE STAR SUBJECT CATEGORIES

STAR is categorized by 10 major subject divisions divided into 74 specific subject categories and one general category/division. The major subject divisions are listed in the Table of Contents, together with a note for each that defines its scope and provides any cross-references. For example:

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

CROSS-REFERENCES

Individual *STAR* abstracts are not ordinarily cross-referenced, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

DOCUMENTS ON MICROFICHE

Documents on microfiche[1] are designated by a pound sign (#) following the accession number. The pound sign is used without regard to the source or quality of the microfiche.

AVAILABILITIES

One or more sources from which a document announced in *STAR* is available to the public is given in each citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26:1 reduction).

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page vii.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, Va. 22161.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $3.00 price, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: Fachinformationszentrum, Karlsruhe. Sold by the Fachinformationszentrum Energie, Physik, Mathematik GMBH, Eggenstein Leopoldshafen, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of 50 cents each, postage free. (See discussion of patents and patent applications below.)

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold in paper copy by the National Technical Information Service at price code A02 ($4.00 domestic, $8.00 foreign). Microfiche are sold at price code A01 ($3.00 domestic; $4.50 foreign). The US-Patent-Appl-SN- number should be used in ordering either paper copy or microfiche from NTIS. Printed copies of *patents* (which are not microfiched) are available for purchase at 50 cents per copy from:

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP-1
National Aeronautics and Space Administration
Washington, D.C. 20546

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services, in addition to the distribution of NASA scientific and technical reports and of *STAR* and its cumulative indexes, is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;

2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference;
4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services. Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
Attn.: Registration Activity
P.O. Box 8757
B.W.I. Airport, Maryland 21240

Organizations abroad should direct requests to the same address, but to the attention of: International Exchange Program.

AVAILABILITY OF STAR ABSTRACTS ON MICROFICHE

Microfiche of the abstract sections of this issue ahd other issues of *STAR* are available on annual subscription from NTIS, Attn: Subscriptions, 5285 Port Royal Road, Springfield, Virginia 22161. Annual subscription rates are $45.00 North America; $90.00 foreign. Abstract sections for previous years retroactive to 1964 are available at the current rates. Microfiche for individual *STAR* issue abstract sections are not available.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
555 West 57th Street, 12th Floor
New York, New York 10019

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents and
Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESA-Information Retrieval Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 8757
B. W. I. Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Branch (NST-41)
Washington, D.C. 20546

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey
1033 General Services Administration
Building
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

Fachinformationszentrum Energie, Physik,
Mathematik GMBH
7514 Eggenstein Leopoldshafen
Federal Republic of Germany

NTIS PRICE SCHEDULES

Schedule A

STANDARD PAPER COPY PRICE SCHEDULE

(Effective October 1, 1977)

Price Code	Page Range	North American Price	Foreign Price
A01	Microfiche	$ 3.00	$ 4.50
A02	001-025	4.00	8.00
A03	026-050	4.50	9.00
A04	051-075	5.25	10.50
A05	076-100	6.00	12.00
A06	101-125	6.50	13.00
A07	126-150	7.25	14.50
A08	151-175	8.00	16.00
A09	176-200	9.00	18.00
A10	201-225	9.25	18.50
A11	226-250	9.50	19.00
A12	251-275	10.75	21.50
A13	276-300	11.00	22.00
A14	301-325	11.75	23.50
A15	326-350	12.00	24.00
A16	351-375	12.50	25.00
A17	376-400	13.00	26.00
A18	401-425	13.25	26.50
A19	426-450	14.00	28.00
A20	451-475	14.50	29.00
A21	476-500	15.00	30.00
A22	501-525	15.25	30.50
A23	526-550	15.50	31.00
A24	551-575	16.25	32.50
A25	576-600	16.50	33.00
A99	601-up	-- 1/	-- 2/

1/ Add $2.50 for each additional 100 page increment from 601 pages up.

2/ Add $5.00 for each additional 100 page increment from 601 pages up.

Schedule E

EXCEPTION PRICE SCHEDULE

Paper Copy & Microfiche

Price Code	North American Price	Foreign Price
E01	$ 3.25	$ 6.50
E02	4.75	9.50
E03	6.25	12.50
E04	7.50	15.00
E05	9.00	18.00
E06	10.50	21.00
E07	12.50	25.00
E08	15.00	30.00
E09	17.50	35.00
E10	20.00	40.00
E11	22.50	45.00
E12	25.00	50.00
E13	28.00	56.00
E14	31.00	62.00
E15	34.00	68.00
E16	37.00	74.00
E17	40.00	80.00
E18	45.00	90.00
E19	50.00	100.00
E20	60.00	120.00
E99 - Write for quote		
N01	28.00	40.00

VOLUME 17 NUMBER 18 / SEPTEMBER 23, 1979

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) 2355

02 AERODYNAMICS 2357

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY 2361

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 2361

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 2362

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 2364

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 2365

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 2371

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 2371

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) 2372

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS 2373

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) 2373

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 2374

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 2377

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING 2377

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 2377

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION N.A.
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 2378
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 2378
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 2379
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 2380
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS 2385
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 2386
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 2389
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) 2392
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 2392
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 2399
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER 2403
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 2409
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS 2410
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 2412
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 2414
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 2415
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) 2417

43 EARTH RESOURCES 2426
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 2430
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 2438
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 2442
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 2447
Includes weather forecasting and modification.

48 OCEANOGRAPHY 2453
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 2454
Includes genetics.

52 AEROSPACE MEDICINE 2457
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 2461
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 2461
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 2462
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 2463
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 2465
Includes computer networks.

63 CYBERNETICS 2465
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 2465
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 2468
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 2469
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 2470
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) 2470
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 2470
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 2472
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 2474
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 2476
Includes light phenomena.

75 PLASMA PHYSICS 2479
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 2481
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 2484
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) N.A.
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 2486
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 2487
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS 2487
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 2488
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 2488
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) 2489

89 ASTRONOMY 2489
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 2491
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 2492
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 2494
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 2495
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

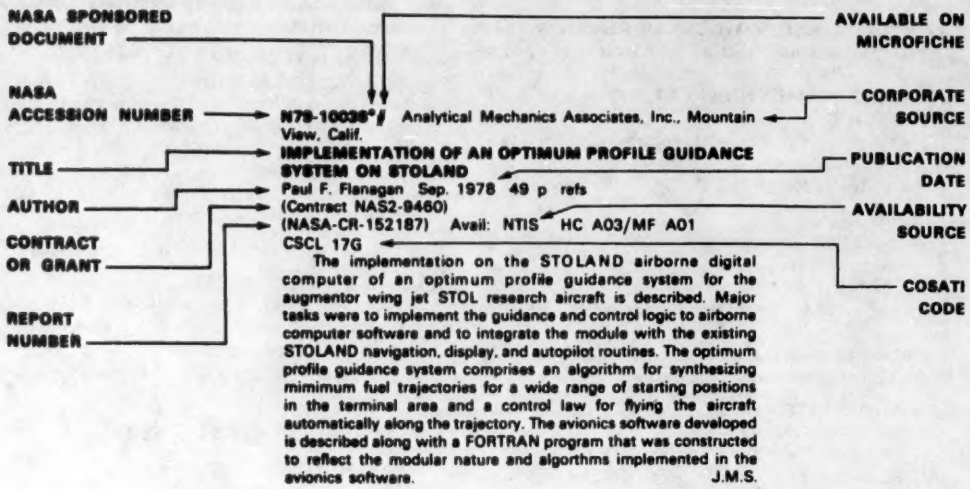
GENERAL

99 GENERAL N.A.

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-51
CORPORATE SOURCE INDEX I-59
CONTRACT NUMBER INDEX I-73
REPORT/ACCESSION NUMBER INDEX I-75

TYPICAL CITATION AND ABSTRACT


NASA SPONSORED DOCUMENT
AVAILABLE ON MICROFICHE
NASA ACCESSION NUMBER
N79-10038*# Analytical Mechanics Associates, Inc., Mountain View, Calif.
CORPORATE SOURCE
TITLE
IMPLEMENTATION OF AN OPTIMUM PROFILE GUIDANCE SYSTEM ON STOLAND
PUBLICATION DATE
AUTHOR
Paul F. Flanagan Sep. 1978 49 p refs
CONTRACT OR GRANT
(Contract NAS2-9460)
AVAILABILITY SOURCE
REPORT NUMBER
(NASA-CR-152187) Avail: NTIS HC A03/MF A01
CSCL 17G
COSATI CODE
The implementation on the STOLAND airborne digital computer of an optimum profile guidance system for the augmentor wing jet STOL research aircraft is described. Major tasks were to implement the guidance and control logic to airborne computer software and to integrate the module with the existing STOLAND navigation, display, and autopilot routines. The optimum profile guidance system comprises an algorithm for synthesizing mimimum fuel trajectories for a wide range of starting positions in the terminal area and a control law for flying the aircraft automatically along the trajectory. The avionics software developed is described along with a FORTRAN program that was constructed to reflect the modular nature and algorithms implemented in the avionics software.
J.M.S.

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research and Support Facilities (air). For Related Information See Also Astronautics.

1.0001, SELF-SUFFICIENT SECONDARY POWER AND STARTING SYSTEM

P. Wood, Signal Companies Inc., Airesearch Mfg Co of Arizona, *402 S. 36th St., Phoenix, Arizona* 85034 (DN796820; N00140-76-C-0206)

Provide for optimum designs of a self-sufficient secondary power and starting system (SSSPS) of minimum weight and volume. The system will make advanced Navy high-performance aircraft completely independent of ground support equipment for engine starting and aircraft pre-flight checkout/standby operation and will also provide emergency in-flight power for high-altitude aircraft control and engine starting.

(Period 7710 through 7803). Secondary power systems were studied and optimized with the following subcontractors for their corresponding aircraft: (a), Grumman for the advanced AVX (type B V/STOL), the type A V/STOL and an advanced version of the F-14 fighter/attack; (b), North American Rockwell for the FV-12A derivative; and (c), Boeing for the advanced tactical fighter (model 987-319) USAF. Life cycle cost and payoff comparisons were made for yellow gear systems versus self-sufficient systems for each aircraft and an advanced development component program plan for the secondary power system was formulated. One area for early development work which can provide a significant payoff in system weight reduction and increased operational effectiveness for both near- and far-term aircraft is the pressurized air start system (PASS). A contract for hardware development for this system is planned for August 1978. The technical effort was completed by 31 October 1977. A rough draft of the final report was submitted to NAPC at the end of December 1977. The rough draft report was reviewed and approved. Final report, power systems study, advanced fighter/attack and V/STOL airplanes, Airesearch report 41-1906 of December 1977 will be available in April 1978.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

1.0002, ADVANCED RESIDUAL STRENGTH DEGRADATION RATE PREDICTION METHODS FOR COMPOSITE STRUCTURES IN MILITARY AIRCRAFT

D.E. Pettit, Lockheed Aircraft Corp., *2555 N. Hollywood Way, P.O. Box 551, Burbank, California* 91503 (DF140290; F33615-77-C-3084)

Current Air Force structural integrity policy requires that all 'safety of flight' structure on new Air Force aircraft will be designed to be damage tolerant, that is, it requires that the structure shall have a specified minimum residual strength (with damage present) at the end of a specified period of unrepaired service usage. Compliance with this policy requires the ability to predict failure modes and residual strength levels in the presence of probable types of manufacturing deficiencies and service-induced damage. The objective of this program is to develop an analytical methodology for prediction of residual strength degradation and damage growth caused by fatigue loading in advanced composite structural laminates. The results will be used to design more damage-tolerant and durable military aircraft structures.

An experimental program will be conducted to measure the residual strength of structural composite laminates as function of fatigue-induced damage growth and to document the damage growth process. The data will be used to develop an analytical methodology for predicting the residual strength. The effect of environment on residual strength and damage growth will also be assessed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0003, AEROELASTIC OPTIMIZATION WITH MULTIPLE CONSTRAINTS

S. McIntosh, Nielsen Engineering & Research Inc., *850 Maude Ave., Mountain View, California* 94040 (DF053140; F49620-78-C-0105)

AF function - advanced flight vehicle structures of lighter weight and increased durability will be necessary to achieve future Air Force mission requirements. Deficiency - current aerospace vehicle designs do not reflect consistent consideration of disciplines influencing structural designs. Objective - the objective of this research program is to investigate structural optimization techniques applicable to multiple constraint conditions representative of aerospace vehicles. How work contributes - this effort is part of a program to develop the basic capability required to achieve optimal structural design in the Air Force.

Research program will investigate the efficiency and accuracy of basic solution algorithms for minimum weight structural designs. Primary attention will be given to math programming (MP) and optimality criteria (OC) algorithms involving flutter speed and vibrational constraints. Fixed and variable mode coordinate will be used in examining convergence to flutter speed and computational efficiency. Delta wing and high aspect ratio wing configurations will be used to investigate the solution accuracies.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

1.0004, AIR DATA STUDY (CTOL)

B. Mellinger, Signal Companies Inc., Air Research Manfacturing Co, *2525 W. 190th St., Torrance, California* 90509 (DN781390; N62269-77-C-0044)

To develop a solid-state air data system for CTOL (conventional takeoff and landing) aircraft. This contract supports work unit ZA601, Agency Accession No. DN681080.

Determine requirements for future air data systems by performing studies and surveying airframe and using activities. Determine the optimum approach for the design of a solid-state air data system to meet future CTOL aircraft requirements. Prepare a developmental specification.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0005, HELICOPTER GROUND MOBILITY SYSTEM DESIGN AND FABRICATION - CONCEPT EVALUATION HARDWARE

R.W. Forsyth, Vehicle Systems Development Corp., *1251 W. 9th St., Upland, California* 91786 (DA0E3797; DAAJ02-77-C-0077)

Design, fabricate and initial test a highly mobile device which will move developmental (AAH and UTTAS) helicopters across rough unimproved terrain for dispersal and maintenance purposes. A secondary objective is adapability of the system to skid-equipped helicopters.

Using specifications and drawings derived from prior year R&D efforts, perform detailed design, fabrication, assembly and check-out of concept evaluation hardware.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0006, FAILSAFE COMPOSITE ROTORHUB CONCEPT

R. Mayerjak, Kaman Aerospace Corp., *Old Windsor Rd., Bloomfield, Connecticut* 06002 (DA0D3976; DAAJ02-75-C-0013)

Fiber-reinforced composited materials have demonstrated their applicability in high-performance aircraft structures such as helicopter rotor blades, wings, rudders and sections of fuselage. The feasibility of fabricating a helicopter main rotor hub using composite materials has been demonstrated under contract with Whittaker Corporation, Research and Development Division. The objective of this program is to develop improved low-cost failsafe rotor hub technology. The use of composite materials can both reduce initial cost and provide a failsafe structure at no increase in weight.

Evaluate new hub concepts for low cost, low weight, ballistic resistance, radar reflectivity, and reliability and maintainability aspects. The better concept will be selected for further development which will include element and assembly fabrication and testing. After analysis of the test results, the hub design will be updated. The CH-54B is the baseline for this design.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0007, FULL TEMPERATURE RANGE FASTENER AREA PROTECTION OF NAVAL AIRCRAFT

R.N. Miller, Lockheed Georgia Co., *86 S. Cobb Dr., Marietta, Georgia* 30060 (DN230021; N00019-74-C-0267)

To obtain a protective system, including organic coating components for controlling the corrosion in fastener areas of naval aircraft under environmental conditions experienced during deployment with the fleet.

A laboratory investigation to develop and evaluate effective methods for protecting fasteners under a wide range of exposure conditions will be undertaken. Several protective systems will be subjected to a simulated flight spectrum. Coatings will be modified to compensate for significant performance deficiencies and then applied to selected aircraft deployed in the fleet.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0008, TORSION FREE WING FLUTTER RESEARCH

H.T. Yang, Purdue Research Foundation, *West Lafayette, Indiana* 47907 (DF047920; AFOSR-77-3265)

AF function - development of new wing concepts can improve aircraft performance. Deficiency - incomplete understanding exists as to the flutter characteristics of a torsion free wing concept. Objective -objective of the research is to develop basic insight into the flutter mechanisms which govern the behavior of a torsion free wing. How work contributes - research supports new concepts for improvement of aircraft.

Analysis of three torsional free wing (TFW) models previously tested by AFFDL will be conducted using the finite-element method and doublet-lattice aerodynamics. These models are (1) cantilever wing, (2) pitch restrained wing, and (3) TFW with aft trim surface. The analysis will establish the basic computation methods for free vibration and flutter of each model. Further, the analysis will study trends of the model and sensitivity of parameters, such as location of pivot shaft and trim surface, and bending and torsional stiffness of the boom.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

1.0009, IR SUPPRESSION DESIGN GUIDE

J.A. Saunders, General Electric Co., Aircraft Engine Group, *1000 Western Ave., Lynn, Massachusetts* 01910 (DA0D4117; DAAJ02-77-C-0038)

Analyze the infrared suppression technology data developed to date and compile into an infrared suppression system detail design guide that will serve as a government and industry standard.

Assimilate the infrared suppression technology data developed to date and arrange the data into a user manual and design guide criteria for hot parts and plume IR suppression for turboshaft engines. The criteria will aid the suppression system designer in making weight, power requirements, and infrared signature tradeoffs for Army aircraft suppression systems.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0010, MILITARY AIRFIELD PAVEMENT PERFORMANCE MODELS BASED UPON OBSERVED DISTRESS MECHANISMS

W.R. Barker, U.S. Dept. of Defense, Army, Corps of Engineers, Waterways Experiment Station, *P.O. Box 631, Vicksburg, Mississippi* 39180 (DA0L8187)

The objective of this investigation will be to develop a systematic methodology to predict the performance of pavements subjected to any type of aircraft loads. The pavements will initially consist of conventional flexible pavements, full-depth asphaltic concrete pavements, and flexible pavements with stabilized layers, and will be expanded to cover pavement sections of innovative material configurations and rigid pavements. The methodology developed will be a subsystem of the overall Corps of Engineers new improved pavement design procedures. The performance models will be linked to the layered elastic and finite element response models which will be used as the basic response models in the new pavement design procedures.

The approach for obtaining the objective will be first to correlate performance with theories. Critical parameters, i.e., stresses, strains, deflections, cracking, spalling, and rut depth in the pavement, will be computed by existing theories. The accumulated damage concept will be employed in the analysis to take into account the fatigue phenomenon of the pavement subjected to repetitive applications of aircraft loads. The performance of full-scale accelerated traffic tests will be used in the establishment of the correlations. The effects of the variability of various parameters (material properties, load intensity, load distributions, etc.) on the reliability of the systems will be investigated.

SUPPORTED BY U.S. Dept. of Defense, Corps of Engineers, Waterways Experiment Station

1.0011, COMPOSITE AIRFRAME REPAIR SYSTEM

R.C. Deitrich, U.S. Dept. of Defense, Navy, Naval Air Engineering Center, *Lakehurst, New Jersey* 08733 (DN896005)

Define composite material repair systems/equipment requirements for the naval aviation maintenance environment.

Conduct literature/data bank search. Analyze maintenance repair operations. Establish level of repair parameters.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0012, ADVANCED TECHNOLOGY PAYOFFS STUDY FOR NAVY V/STOL AIRCRAFT

N. Daninhoffer, Grumman Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN881376; N62269-78-C-0034)

To establish a rationale for commitment of systems development resources to advanced structural concepts vs. other

subsystems. Program involves a comparative study of the relative system payoff to be gained from the development of advanced structure technology (especially composites) compared to improvements in other major subsystems. This work is in support of work unit ZA601, 'Aircraft Technology', Agency Accession No. DN 681080.

This program will provide the return on investment for several applicable technology areas which promise high potential payoffs for high-performance Navy V/STOL aircraft. The study will develop a payoff analysis methodology that will enable an objective evaluation of V/STOL advanced technology investment decisions. This methodology will then be used to trade off investments in major payoff technologies in the categories of structures, propulsion and aerodynamics. This shall be accomplished by trading off new investment costs for alternate technology developments against life cycle costs and IOC dates for V/STOL configurations using advances in the subject technologies. The output of the study will be a recommended investment plan for the technologies evaluated and recommendations for further application of the methodology for an all-inclusive investment analysis.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0013, MODULAR LIFE CYCLE COST MODEL FOR ADVANCED AIRCRAFT SYSTEMS

B. Rachowitz, Grumman Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DF135570; F33615-76-C-3056)

Since operational support costs comprise such a large part of total life cycle costs, these relationships are needed in order to evaluate the cost impact of alternative candidate designs and to effectively conduct trade studies which compare the cost/performance advantages of these competing designs. The objective of this study is to determine specific parametric relationships between selected operational concepts, primary performance characteristics, and life cycle support costs which can be used to develop a model for estimating the operating and maintenance costs of future advanced military aircraft early in the design phase of the development program.

Study will be implemented to identify, analyze and quantify the relative cost sensitivity of a range of system parameters of the kind available early in the design process. Information derived will be used to generate parametric costing techniques and methodology for determining system support costs early in the design phase of an aircraft program. Computerized mathematical/statistical analysis models and techniques will be developed. Analytical tests will be formulated, capable of determining the degree of validity implicit in these models and the accuracy/adequacy of the methods developed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0014, HIGH-SPEED ROTOR NOISE 12937-E

M.P. Isom, Polytechnic Inst. of New York, Brooklyn Campus, School of Science & Engineering, Dept. of Aerospace Engin & Applied Mech, *333 Jay St., Brooklyn, New York* 11201 (DA0R5571; DAAG29 76 G0035)

To calculate the sound field generated by subsonic and transonic rotor blades in hover and forward flight with particular emphasis on the relative importance of local geometry and shock waves. The proposed research is strongly relevant to the interests of the Ames Directorate at AMRDL in understanding the transonic aerodynamics and acoustics in helicopters.

To formulate the noise problem in a body-fixed coordinate system in such a way that the usual aerodynamic singularity does not occur in the radiation integrals and that the theoretical framework can accommodate non-linear transonic aerodynamics in the blade tip region.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

1.0015, COMPRESSIBLE SUBCRITICAL AIRFOIL DESIGN AND TEST

G.M. Gregorek, Ohio State University, Columbus Campus, School of Engineering, Dept. of Aeronautical & Astronaut Engin, *190 N. Oval Dr., Columbus, Ohio* 43210 (DF141270; AFOSR-78-3476)

This work unit supports the development of advanced USAF high-altitude long-endurance aircraft. Presently, high-altitude long-endurance aircraft used for military missions are limited in altitude and payload capability. Advanced technology airfoils will help alleviate these lifting surface associated problems. This work effort is the design and wind tunnel test of compressible subcritical airfoils for future USAF aircraft, using a previously developed airfoil methodology. Use of these advanced technology airfoils will permit flight envelope expansion on future military high-altitude long-endurance air vehicles.

A compressible inverse airfoil design procedure developed for AFFDL/FXM will be used to configure several high-performance airfoils for high-altitude long-endurance aircraft applications. The most promising of these designs will be tested two-dimensionally in the Ohio State University transonic wind tunnel facility.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0016, PERFORMANCE INVESTIGATIONS OF ADVANCED FLIGHT VEHICLES

B.R. Benson, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF138530)

Mission requirements can impose performance levels difficult or impossible to achieve within today's technology. New concepts or approaches are constantly being evaluated and analyzed to assess their payoff not only in performance enhancement but the impact on cost. The objective of this effort is to investigate new concepts and technologies to assess the overall payoff for future vehicle application.

This will be an analytical performance analysis consisting of several elements. The first element will explore the aerodynamic potential in missile design. The relation between performance parameters and aerodynamic characteristics for missiles will be developed and the importance of the aerodynamic factor established. The second element will be to establish the rationale for supersonic cruise capability in a fighter and the third element will be exploration of future missile concepts.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0017, FORWARD SWEPT WING AEROELASTIC STUDIES

V.C. Sherrer, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF142370)

Recent analytical studies have shown that forward swept wings offer the performance advantages of reduced drag and increased maneuverability over aft swept wings. The construction of all-metal forward swept wings was first attempted in the late 1930's, but until recently, designs with large forward sweeps proved to be impractical. This was because prohibitive weight increases in the wing structure were necessary to overcome the static instability known as divergence. Current analyses have shown, however, through the use of aeroelastic tailoring of advanced composite wing skins, the divergence problem can be eliminated without a significant weight penalty. The objective of this work unit is to provide experimental verification of the ability of advanced composites to eliminate divergence in forward swept wings while also satisfying flutter requirements. A secondary objective is to provide the investigators with an increased understanding of the mechanism of divergence and its relationship with advanced composite materials. This study will contribute to the advancement of forward swept wing technology and to possible improved performance of future military aircraft.

Design and analysis studies are first conducted on various forward swept wing configurations. Then an aeroelastic low-speed wind tunnel model configuration is selected and designed using the computer procedures TSO and NASTRAN. The cantilever wing model will be a simple composite plate with a balsa or foam sleeve forming a symmetrical airfoil. The model will be

designed to diverge within the low-speed wind tunnel operating regime. If possible, flutter characteristics of forward swept wings will also be experimentally determined. A cable restraint system will be used to prevent model destruction. Low-speed wind tunnel tests will be conducted with several composite plate designs and other important parameter variations. Experimental results will be compared with analytical predictions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0018, INVESTIGATION OF TACTICAL FIGHTER FOREBODY FLOW FIELD AND INTEGRATED INLET PERFORMANCE DATA

L.E. Surber, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF131210)

One of the critical problems in preliminary aircraft design is the deficiency of technology in the area of airframe-propulsion integration. This program seeks to provide a broader range of fundamental design criteria for supersonic external compression air inlets, thus providing the means to reduce development cost of future propulsion system installations. The objective of this program is to provide the capability to design an aircrafft air intake from the outset which will combine simplicity, high performance, and reliability to such a degree that the necessity for subsequent cycles of test and redesign will be significantly reduced or eliminated.

In-depth investigation of wind tunnel data generated under F33657-69-C-1209, F33615-72-C-1747, and F33615-72-C-1160 will be accomplished. This effort will include examination of forebody flowfields, inlet diverter flow, inlet face total pressure distribution, duct total and static pressure distributions, compressor face pressure recovery and distortion, and inlet/airframe drag data. Both steady-state and dynamic data will be used to determine sources of flow distortion. Effects of inlet design variation on inlet-related drag will be examined. The associated effects of various inlet designs and installations will be used to suggest design improvements.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0019, ADVANCED FIGHTER SIMULATOR LIGHTING ENVIRONMENT STUDIES

J.A. Uphaus, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF141730)

This effort supports the development of advanced multipurpose cockpit displays to be used primarily in fighter aircraft. The current projected use of multipurpose cathode ray tube displays and other solid-state light-emitting displays as replacements for conventional fixed format cockpit instruments has generated a need for detailed specifications and design guidelines to insure display legibility over the extreme range of ambient lighting conditions experienced in an aircraft mission. Legibility of heads-up displays with flexible format capability, visibility of warning and caution indicators, and control of cockpit lighting to maintain maximum pilot capability to recognize and track air and ground targets are additional factors which need definitive design guidelines from a lighting systems standpoint. This program involves the development of guidelines to be used for the development of multipurpose displays, display formats, and lighting systems that insure pilot capability to successfully perform fighter mission tasks in future integrated cockpits.

This effort will involve conducting experiments to develop guidelines for insuring legibility of advanced cockpit displays. These experiments will be conducted in a small-scale simulator capable of simulating daylight to total darkness lighting conditions experienced in flight. In addition, experiments on the small-scale controlled luminance simulator will also provide data needed to formulate detailed design requirements for a crew station design facility (CSDF). This CSDF will provide the capability to dynamically simulate the full range of ambient luminance conditions including air and ground targets and to evaluate the impact of high luminance levels on a crew's ability to acquire and effectively use visual information inside and outside the cockpit.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0020, FLIGHT LOADS SIMULATION CAPABILITY

F.K. Bogner, University of Dayton, School of Engineering, Dept. of Mechanical Engineering, *300 College Park Ave., Dayton, Ohio* 45469 (DF138400; F33615-76-C-3135)

There is currently no facility in existence in the free world in which flight loads on an aircraft structure can be realistically simulated during a ballistic impact on the structure. Also, it is presently very difficult, if not impossible, to determine residual strengths of large sections of aircraft structure after they have been damaged by ballistic impact. The objective of this effort is to design and fabricate a loading system which will have the dual capability listed above. Development of such a facility will result in greatly improved simulation during survivability/vulnerability tests on USAF aircraft.

A contractor will be selected through a multiple source procurement to perform this effort. The contractor will design and build the loading system which will be installed in the AFFDL vertical gun range. In addition, the contractor will supply test specimens which will be tested in the facility to evaluate its performance. The contractor will also develop an analysis capability as a part of this effort which can be used to predict stresses and probable points of failure in ballistically damaged aircraft structure.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0021, AIRCRAFT FUEL CONSERVATION PROGRAM (CURRENT INVENTORY AIRCRAFT)

C.R. Lampart, U.S. Dept. of Defense, Navy, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate, *Warminster, Pennsylvania* 18974 (DN881356)

The objective of this analysis program is to investigate and identify ways to conserve energy during the operation of current inventory naval aircraft. The goal is to identify aircraft fuel carrying modifications which could be incorporated by 1985 and fuel saving changes to current operating procedures which could be put into service as so n as possible.

The approach will follow two paths: (1) Conduct energy saving technology application studies on selected naval aircraft via contractors. Conduct in-house analysis of the impact of the proposed energy saving technologies on the performance, cost, and abilities of the aircraft. (2) Conduct mission/fuction analysis to identify alternative tactics and/or payload (sensors, weapons) which could result in an energy savings.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0022, OPERATIONS LOADS SURVEY DATA MANAGEMENT

A.L. Eubanks, Bell Helicopter Co., Division of Textron, *P.O. Box 482, Fort Worth, Texas* 76101 (DA0E3781; DAAJ02-77-C-0053)

Provide access to the AH-1G operational loads survey (OLS) data tape library (175 magnetic tapes containing digital flight test data from the aerodynamic and structural loads survey of a helicopter during operational maneuvers) allowing the user to select the data to be retrieved, specify certain processes by which the data may be reduced and/or analyzed and choose the mode by which the data will be presented.

Develop a computer software system that will process the AH-1G OLS data. The software system must accept data formated as the existing OLS digitized data tapes and be provided with output options capable of producing listings, plots and interactive graphical displays on CRT.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Air Mobility Research & Development Lab.

1.0023, HT 69-2- BALLISTIC RANGE OPERATION & GENERAL MAINTENANCE

E.M. Pard, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Applied Technology Lab., *Fort Eustis, Newport News, Virginia* 23604 (DA0B4016)

To operate, maintain, and provide instrumentation to support the ballistic testing of experimentally designed and fabricated concepts that are intended to increase the survivability of Army aircraft.

Provide continuous ballistic/instrumenttion support for in-house & contractural efforts. Ballistic support is provided in conjunction with developing, testing, and evaluating experimental materials and systems that increase the survivability of Army aircrews & aircraft.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0024, ASSESSMENT OF OIL-WETTED COMPONENT DEBRIS DISCRIMINATING AND FILTRATION SYSTEM HT RM 78-04

Unknown, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Applied Technology Lab., *Fort Eustis, Newport News, Virginia* 23604 (DA0E3823)

Demonstrate ability of system modification to attain: (a) 30 percent reduction in the unscheduled removals brought about by poor diagnostics, (b) reduction in the current rate of false indications of current chip detectors (approximately 86 percent), (c) extension in the oil change interval on the engine from 100 hours to a minimum of 500 hours and 300 hours to 900 hours for the main transmission.

As presently structured, 40 UH-1 aircraft will be modified with high efficiency full-flow-through burn-off chip detectors and superfine filtration on the engines and main transmissions. In addition, the 42-degree and 90-degree gearboxes will also have burn-off chip detectors. The modified aircraft will be flown for one year and the data accumulated on system performance and oil life will be compared with a control group of 20 aircraft.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0025, RESEARCH IN STRUCTURES

J.L. Shipley, U.S. National Aeronautics & Space Admin., Office of Aeronautics & Space Technology, Langley Research Center, *Hampton, Virginia* 23665 (DA0E3550)

To conduct basic research for fundamental structures and materials application technology necessary for a viable structures program. Efforts include analytical techniques for complex structures, development of fatigue and fracture mechanisms in composite materials, the demonstration of advanced materials on helicopters, and the improvement of prediction techniques for structural dynamics.

In conjunction with NASA-LRC, analytical techniques for complex structures will include the application of minicomputers in finite element analysis and participation in the IPAD program. In the analysis and prediction of fatigue and fracture composites, experimental data will then be incorporated into a statistical model for fatigue behavior of graphite epoxy. Environmental effects on fatigue will be continued. The evaluation of environment effects and durability of composite components in a service environment and comparison to specimens under the same environment will be initiated. The composite fuselage investigation will continue a program to develop an efficient technique for attachment of hardpoints to an all-composite panel. The crash impact energy absorption capability of composites will be compared to conventional sheet metal construction designed to the same static strength requirements. Fuselage structural dynamics will explore other finite-element techniques to helicopter dynamic response.

SUPPORTED BY U.S. Dept. of Defense, Aviation Systems Command, Air Mobility Research & Development Lab.

1.0026, MULTI-AIRCRAFT TACTICAL EVALUATION PROGRAM

D.S. Hague, Aerophysics Research Corp., *Bellevue, Washington* (DF137350; F33615-78-C-3000)

This effort supports analysis efforts in air-to-air combat which contribute to air superiority missions. Current air combat evaluation methods for multiple aircraft engagements and advanced technology vehicles are almost totally lacking. Hence, the inability to analyze such engagements makes it difficult to assess how new concepts or tactics contribute to the above mission. The goal of this effort is to develop the needed methodology to analyze advanced technology aircraft and tactics in multiple vehicle air-to-air engagements. This work will provide a tool for tacticians to use in determining the effectiveness of new concepts and tactics and result in improved capability to perform air-to-air functions for the Air Force.

Work is to mathematically model the physical air-to-air engagement of multi-vehicles including development of optimal or sub-optimal control strategies. The model developed is to incorporate the ability to handle conventional as well as unconventional aircraft capabilities such as direct force control and thrust vectoring/reversing in a realistic environment. Conventional and advanced weaponry is to be modeled including long-range missiles, maneuverable missiles, steerable guns, and laser weaponry. All facets of military mission operation are to be considered with appropriate measures of merit to determine payoffs for advanced technology and tactics for multi-vehicle engagements.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, AN ANALYTIC ARTIFICIAL SATELLITE THEORY

K.T. Alfriend, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN680001)

The long-range objective is to develop an accurate analytic artificial satellite theory. The immediate objective is to develop a partial analytic theory using Vinti's theory as an initial approximation in order to evaluate the feasibility of this approach for the development of a full analytic theory. Such a theory could substantially reduce the costs incurred in the orbit prediction and determination of military satellites.

A partial analytic theory which uses Vinti's solution as the initial approximation and which includes some of the zonal and tesseral harmonics, and lunar and solar perturbations will be developed. This theory will then be compared with other theories to determine the best approach for developing a complete analytic theory. The complete analytic theory will then be developed. To develop the theory the initial approximation will be expressed in a suitable set of canonical variables. The perturbing potential will then be expressed in this set of variables and the method of lie series will then be used to develop a solution. All algebraic manipulation will be performed on the computer using algebraic manipulation routines.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

2.0002, RADIATION SURVIVABILITY OF SATELLITE COMPONENTS

J.C. Ritter, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880086)

The objective of this work is to increase the level of survivability of spacecraft components in combined nuclear and natural radiation environments. This work has direct applications to the hardening of Navy satellite systems to meet the JCS nuclear hardening guidelines.

The approach is to investigate the use of multiple-element X-ray shields to minimize the dose deposited in satellite components per unit shielding mass. Initially secondary photons and particles

will be neglected, but they will be included in later calculations. Optimal combinations of elements will be selected for X-ray shielding. Other radiation environments such as natural and weapon injected electrons, trapped and solar flare protons, etc., will then be included for selected orbital parameters. The studies will include spacecraft orbit-dependent radiation environments.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, A FUNDAMENTAL STUDY OF THE PROCESSING OF OXIDE DISPERSION STRENGTHENED METALS

W.D. Nix, Stanford University, School of Engineering, Dept. of Materials Science & Engin, *Stanford, California* 94305 (DF046250; AFOSR-77-3128)

AF function - the demanding requirements of high-performance aerospace vehicles make clear the need for materials with premium mechanical properties. Dispersion strengthened alloys are being used in the hottest sections of some high-performance gas turbine engines and their use is expected to become even more widespread in aerospace systems of the future. Opportunity - with the recent discovery and development of mechanical alloying, it is now possible to dispersion strengthen virtually any alloy of interest. Objective - this research will determine the mechanical alloying and deformation processing factors that are most important in producing homogeneous oxide dispersions together with elongated grain structures. How work contributes - this information is required to develop sufficient understanding of the mechanisms responsible for elongated grain structures that guidelines might be written for producing these desirable microstructures in oxide dispersion strengthened superalloys of interest to the Air Force.

A fundamental investigation will be undertaken to determine the effects of oxide content, and thermal and mechanical history on the shapes and crystallographic orientations of recrystallized grains in various particle-strengthened alloys (both model systems and Ni-Cr-Al systems).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0002, POLYMERIC MATERIALS WITH SPATIAL GRADIENTS IN STRUCTURE AND PROPERTIES

M.G. Shen, University of California, Berkeley Campus, School of Engineering, Dept. of Chemical Engineering, *Berkeley, California* 94720 (DN223290; N00014-75-C-0955)

The use of polymeric materials by the Navy is pervasive, varying widely in form and function from rubber tires to hydraulic fluids. The properties of such materials are sensitive to the chemical nature and physical arrangement of constituent long chain molecules. This research provides a means for introducing controlled structural variations to improve the performance of plastics and rubbery materials in naval applications such as noncrazing aircraft windows, noise, shock and vibration absorbers and plastic gasoline tanks.

Chemical and physical methods for generating ordered, spatial variations in the composition, structure and properties of polymers are investigated. These studies will cover alternative preparative and characterization techniques as well as mechanical and transport properties. Emphsis will be placed on determining relative merit and limits of promising approaches and the development of property-structure relationships in model systems.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0003, STRUCTURE AND PROPERTIES OF GLASSES

J.D. MacKenzie, University of California, Los Angeles Campus, School of Engineering & Applied Science, Dept. of Materials Engineering, *405 Hilgard Ave., Los Angeles, California* 90024 (DF039960; AFOSR-75-2764)

AF function - advanced aircraft and tactical missile systems employ glass as a structural and optical component which requires superior mechanical, thermal and optical performance under extreme environmental conditions. Deficiency - the predictive property methodology which is essential for the design of new glass compositions with tailored properties is not well understood. Objective - this research is to establish the fundamental structure-property relationships for optimizing thermal expansion, mechanical strength and hardness, chemical durability, and interactions with infrared and visible radiation in glass. How work contributes - this research is expected to provide concepts and practical compositions for glasses which will meet aircraft windshield and infrared dome performance and laser-resistant materials requirements.

Glass chemistry will center on (1) the understanding of how glass composition and structure control thermal expansion, (2) the mechanism of ion-exchange strengthening of glass under pressure and the effects of surface structure, (3) determination of the effects of structure and chemical composition on optical properties, particularly infrared absorption and reflection in fluoride glasses and glass-ceramics.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0004, INFRARED CHEMILUMINESCENCE STUDIES OF ION-MOLECULE REACTIONS IN A FLOWING AFTERGLOW

S.R. Leone, University of Colorado, Boulder Campus, School of Arts & Sciences, Dept. of Chemistry, *1200 University Ave., Boulder, Colorado* 80302 (DF051780; AFOSR-78-3565)

AF function - Air Force operations in reconnaissance, communication, detection and discrimination require understanding of complex atomic, molecular and ionic chemical phenomena that take place in the natural and disturbed atmosphere. Deficiency - there is insufficient understanding of fundamental processes of ion-molecule reactions involving atmospheric constituents which can emit various forms of radiation. Objective - investigate the fundamentals of ion-molecule reactions by studying infrared chemiluminescence in a flowing afterglow apparatus. Obtain information on product state vibrational distribution occurring in ion-molecule reactions. In cases where reactions are highly exothermic and produce very highly excited vibrational states, obtain relaxation rates of such highly excited species and measure vibrational deactivation rates of molecular ions. How work contributes - provides a measure of ionic species formed in atmospheric reactions, radiation emitted from such species, and lifetimes and deactivation processes. Also, will have a bearing on emissions and lifetimes of species formed in rocket exhausts in atmosphere.

A flowing afterglow apparatus, incorporating mass and infrared detectors, will be constructed and will permit detailed wavelength and time-dependent studies of ion molecule reactions which yield infrared chemiluminescence. A unique flow, reverse-drift region will be used to select only positive or negative ions for study with removal of neutral radicals. Specific systems to be studied involve many reactions of interest in the upper atmosphere and sources of atmospheric infrared emissions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0005, MATERIALS SUPPORT TECHNOLOGY - DIMENSIONAL STABILITY AND MICROCREEP BEHAVIOR OF GYRO-STRUCTURAL MATERIALS

A.W. Ruff, U.S. Dept. of Commerce, National Bureau of Standards, *Washington, District of Columbia* 20228 (DN775553; N00014-77-F-0010)

The overall objective of this program is to apply materials research to gryo-structural materials used in the inertial measurement units that provide guidance and control to space vehicles and missiles. The immediate goals are (1) to measure static dimensional stability and microcreep behavior of gyro-structural beryllium alloys and (2) to investigate the causes and mechanisms responsible for microdeformation of these materials. The first

part calls for extremely small and accurate measurements of strain distortion with a precision of plus or minus ten to the minus seven initially and plus or minus ten to the minus eight in the second year. The second part requires detailed and comprehensive microstructural characterization and accurate analyses of chemical composition, which will be correlated to provide an explanation for the measured strain distortion and microcreep. The work will be coupled to related work groups at the Draper Laboratory.

Initial measurements will be made on commercial be alloys. Microcreep will be measured using displacement transducers. An optical displacement measuring technique will be developed and refined to permit future measurements at plus or minus ten to the minus eight. A holographic/interferometric displacement measuring and loading system will be designed and built to measure deformations of a hydrostatically loaded structural shape of simple geometry. Assorted microstructural studies and chemical analyses will be carried out on test materials, both As-prepared and As-deformed.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0006, NAVAL VEHICLE TECHNOLOGY - MOLECULAR ASPECTS OF POLYMER AND ADHESIVE FAILURE

W.D. Bascom, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN620102)

To improve the strength and performance of structural adhesives and fiber-reinforced composite materials by improving the mechanical properties of polymers and their adhesion to metals and reinforcing fibers. This research is of importance in improving the strength of the composites and adhesives used in naval aircraft and ship construction.

The relationships of chemical composition and structure to the failure micromechanics of polymers under stress are being determined experimentally. The investigational techniques include thermorheological and thermomechanical analyses, fracture testing and microscopy.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

3.0007, NEW FUELS DEVELOPMENT FOR SCRAMJET ENGINES

A.B. Harvey, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN780314)

The objective of this proposal is to recommend an alternate fuel for a scramjet missile which has a relatively low toxic vapor yet high volumetric heating value (1.2- 1.3 x 10(6) btu/ft(3) and short ignition delay times (less than 0.1 ms.)

A computer is used to model and screen potential fuels with the above properties. Computer codes are expanded to include other combustion systems besides hydrocarbon fuels, such as diborane and pentaborane. Ultimately new fuels with low toxicity, high heat value and short ignition time will be screened by computer, thus producing large savings in test fuel procurement, testing and costly synthetic development. Data from test facilities at JHU/APL and DOD facilities will be coupled with the calculations.

SUPPORTED BY U.S. Dept. of Defense, Navy

3.0008, BASIC STUDIES RELATING TO THE SYNTHESIS OF UNSYMMETRICAL DIMETHYL HYDRAZINE AND MONOMETHYL HYDRAZINE BY CHLORAMINATION

H.H. Sisler, State University System of Florida, University of Florida, School of Arts & Sciences, Dept. of Chemistry, *208 Tigert Hall, Gainesville, Florida* 32601 (DF042070; AFOSR-76-2915)

AF function - substituted hydrazines are components of several presently used liquid rocket fuel mixtures. Monomethyl hydrazine (MMH) is a major component of the fuel for the proposed space shuttle. The principal use of unsymmetrical dimethyl hydrazine (UDMH) is in the Air Force Titan II and Titan III rocket. Deficiency - due to the carcinogen nature of the presently used starting material for making UDMH, there is a need for kinetic and mechanisms studies of alternate processes for making the fuel. Objective - this research is aimed at better understanding kinetics and mechanisms of the Sisler process for making UDMH and MMH. How work contributes - the information obtained will be exceedingly valuable in optimizing the manufacture of UDMH and MMH by the Sisler chloramination reaction.

The studies include investigations of the oxidation of monomethyl hydrazine (MMH) and unsymmetrical dimethyl hydrazine (UDMH) with oxygen, the thermal or hydrolytic conversion of dimethyltriazanium chloride of UDMH and the reactions of chloramine (CA) with monomethylamine (MMA), MMH, dimethylamine (DMA) and UDMH in various media including aqueous caustic solutions. The goal is to optimize the yield of UDMH and MMH by the chloramination of MMA and DMA.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0009, STRESS CORROSION CRACKING OF HIGH-STRENGTH ALUMINUM ALLOYS

E.N. Pugh, University of Illinois, Urbana Champaign Campus, School of Engineering, Dept. of Mining & Metallurgical Engineering, *2527 Hydrosystems Lab., Urbana, Illinois* 61801 (DF046670; AFOSR-77-3175)

AF function - hydrogen embrittlement is a serious problem that causes mechanical property degradation in our most significant aircraft materials including steels, titanium, aluminum and mickel-base alloys. Opportunity - hydrogen-related phenomena are suspect of playing key roles in the mechanisms of stress corrosion cracking, subcritical crack growth, hot salt corrosion, weld cracking, temper embrittlement, fatigue crack growth, and brittle fracture in general. Objective - this investigation will identify the role played by hydrogen in stress corrosion cracking of high-strength aluminum alloys through brittle film analysis, crack growth studies, hydrogen permeation studies, and hydrogen charging experiments. How work contributes - the various forms of hydrogen-related mechanical property degradation severely restrict the serviceability of important aircraft materials. Basic understanding of the manner by which hydrogen acts to reduce mechanical strength and cause failures is important if we are to minimize and control these forms of attack.

Specific emphasis will be placed on the role of hydrogen in the intergranular stress corrosion cracking of high-purity Al-Zn-Mg ternary alloys (7000-series model). The research will pursue four major issues: the possibility of hydride formation as a brittle film on fracture surfaces, hydrogen diffusion in the grain boundary region ahead of the crack as the rate limiting step in the cracking process, and control of the diffusion process by modifying the microstructure, correlation of crack velocity with direct measurements of hydrogen diffusion, correlation of hydrogen concentration to ductility loss.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0010, DEVELOPMENT OF BERYLLIUM-TITANIUM COMPOSITE FAN BLADES FOR NAVAL AIRCRAFT ENGINES

M. Herman, General Motors Corp., Detroit Diesel Allison Div, *4700 W. 10th St., Indianapolis, Indiana* 46206 (DN590036; N00019-75-C-0264)

Develop improved beryllium/titanium composite extrusions by optimizing process variables and obtain the design criteria for prototype fan and compressor blades.

Develop and evaluate a process to integrally forge a root attachment on the end of extruding beryllium/titanium composite blade forgings.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0011, EFFECTS OF SURFACE ACTIVITY ON THE NOTCH FATIGUE OF ALUMINUM ALLOYS

B.L. Averbach, Massachusetts Inst. of Technology, School of Engineering, Dept. of Metallurgy & Materials Science, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF042310; AFOSR-76-2924)

AF function - aircraft structures have been and will continue to be made primarily of high-strength aluminum alloys. Deficiency - one of the design parameters limiting the full exploitation of these alloys is the notch-fatigue strength. Impressive increases in yield, tensile, and smooth bar fatigue strength have been made by various treatments and additives; however, the notch-fatigue strength scarcely improves at all. On the other hand notch-fatigue is greatly influenced by the ambience. Objective and how work contributes - this research will study the influence of ambient atmospheres on the notch-fatigue of aluminum in order to determine why the propagation of a crack is only partially dependent on the yielding phenomena at the head of a crack and is influenced greatly by surface phenomena.

Fracture of various aluminum alloys will be initiated in water vapor and dry air environments by fatigue and by cracking with a wedge. The influence of the environment on the initiation step will be measured by determining the cracking fore and by measuring the KTH in fatigue. Measurements will also be made of the crack propagation rate in various environments to distinguish between the effects of the initiation and the propagation mechanisms and their interaction with the environment. Fracture surfaces will be examined by ESCA and scanning electron microscopy in an effort to observe the microscopic mechanisms of fracture and how they are influenced by the environment.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0012, GROWTH AND CHARACTERIZATION OF LASER MATERIALS

J.L. Caslavsky, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center, *Watertown, Massachusetts* 02172 (DA0F4692)

Growth and characterization of crystalline laser materials for use as laser range finders and target designators, required by the Army for surface mobility applications. Pacing materials problem - command con. & intel.- efficient laser hosts. Thrust - target acquisition. Mission area - missiles.

Automated hem will be used to grow 7.5 cm diameter, 2 kg Nd-YAG single crystals. A detailed knowledge of the ternary phase diagram in the system Al sub 2 0 sub 3-Y sub 2 O sub 3- Nd sub 2 O sub 3 is required for growth. It will be studied by the optical high-temperature differential thermal analysis apparatus designed and built in AMMRC. The temperature is sensed optically by two sensors and electronically differentiated. The temperature differences are recorded simultaneously with absolute temperature. The results will be analyzed and the critical region of ternary phase diagram determined.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

3.0013, COMPATIBILITY OF LUBRICANTS WITH ADVANCED BEARING AND GEAR MATERIALS

R. Valori, U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center, *Trenton, New Jersey* 08628 (DN796811)

To assure the availability of lubricant/steel combinations for future propulsion systems which have optimum reliability with respect to bearing and gear performance.

Candidate bearing steels in combination with advanced ester lubricants will be evaluated for their rolling contact fatigue, scoring, friction and wear characteristics on two bench testers namely: the rolling contact (RC) fatigue machine and geared roller test machine (GRTM). The test will cover a range of temperature, load, sliding and rolling conditions. In addition various ratios of elastohydrodynamic (EHD) lubricant film to composite surface roughness will be run to determine the scalability of this factor to various lubricant/steel combinations. At least ten different bearing steels will be used in the program over a four-year period. These will include four case hardened steels, three wrought steels. Any promising other new steels which become available during the course of this program will also be evaluated. Those which are corrosion resistant steels will be evaluated for their corrosion resistance by a modified ASTM test method. All tests will be compared to Hercolube, a lubricant/M50 steel, as a baseline.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Material Command

3.0014, CONTROLLED GRAIN BOUNDARY STRUCTURES IN SUPERCONDUCTORS

E.J. Kramer, Cornell University, Ithaca Campus, School of Engineering, Dept. of Materials Science & Engineering, *242 Carpenter Hall, Ithaca, New York* 14853 (DF037890; AFOSR-77-3107)

AF function - high-temperature superconducting materials are needed for application in airborne multimegawatt power generation and conditioning systems. Opportunity - research specifically directed toward the synthesis and characterization of high transition temperature metallic compounds can provide a greater margin of design efficiency and operational reliability than presently available superconductors. Objective - the aim of this research is to produce superconductors with controlled grain boundary microstructures and to characerize the flux pinning due to this controlled microstructure. Experiments on bicrystals and films are designed to establish which of the basic interaction mechanisms such as, the upper critical magnetic field anisotropy interaction, grain boundary stress field interaction, electron scattering interaction or the electron scattering interaction enhanced by solute segregation, is dominant in developing an elementary interaction force between the flux line lattice and grain boundaries in superconducting materials. How work contributes - the use of superconductors in airborne multimegawatt power generation and conditioning systems is desirable because of their ability to carry much larger current densities than conventional conductors and with much lower losses. Hence very high magnetic fields can be generated with smaller, lighter windings. For many potential applications the performance of high field magnets and solenoids, electric motor windings, superconducting rotors in power generators, transformers and induction energy storage systems could be significantly improved if the upper critical field, the current carrying capacity and the critical transition temperature of the superconducting material could be enhanced.

Several different approaches to producing the optimum controlled grain boundary sample are being investigated. Macroscopic bicrystal superconductors are being grown by electron beam float zone techniques from two crystal seeds. A simple method for producing bicrystals of controlled misorientation has been invented and such bicrystals will be used for epitaxial deposition of alloy superconducting bicrystal films with the plane of the grain boundary perpendicular to the film. If more grain boundary area is needed, controlled grain boundary structure films of Ag or Au will be used as substrates for epitaxial deposition. These films have a grain size which is proportional to the original film thickness. (Text Abridged.)

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0015, STUDY THE EFFECT OF SERVICE LIFE ON THE STRUCTURAL DURABILITY OF BORON/EPOXY COMPOSITE AIRCRAFT STRUCTURES

P. Donohue, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN790077; N00019-77-C-0412)

To obtain knowledge on the practical and analytical considerations of the service durability of boron/epoxy composites.

The tests will consider the effects of service life upon the basic laminate and the adhesive bond lines of the integrally molded stepped titanium splice-to-laminate and laminate-to-aluminum honeycomb core joints.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0016, COMPOSITES COST TRACKING DATA AND ANALYSIS

B.I. Rachowitz, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DF139530; F33615-77-C-3022)

This work unit supports the effort to build up an accurate airframe design-to-cost capability. The advantages to be offered by this specific effort include the ability to estimate the cost of advanced composite airframe structures. The objective of this program are detailed manufacturing cost data for production aircraft structural components manufactured from advanced composite materials and validation of the advanced composites cost estimation model which was developed under a previous Air Force contract. This work will help in the design of military aircraft structures which meet mission requirements with the lowest life cycle costs.

Cost data will be generated from actual observation of various steps in the manufacturing processes of composite parts and the recording of the manhour data on a part-by-part, operation-by-operation basis. The cost model computer program will be exercised to make analytical predictions of the manhours and these will be checked against the actual hours recorded.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

3.0017, MATERIALS CHARACTERIZATION

J.A. Bruce, U.S. Dept. of Defense, Air Force, Rome Air Development Center, *Griffiss Air Force Base, Rome, New York* 13441 (DF903470)

AF function - development and improvement of electromagnetic materials and components used in C3 applications. Deficiency - need to characterize and evaluate structure and properties of EM materials and components to aid in their development and improvement. Objective - to characterize, evaluate and measure the properties of materials and device structures in both thin film and bulk form. How research contributes - this work is direct support of both the materials and device technology areas of the laboratory.

Various X-ray diffraction and electron beam techniques such as SEM, TEM, electron diffraction and Auger electron spectroscopy, will be used to characterize and evaluate EM materials and structures. Other techniques such as optical microscopy, microhardness thermal conductivity measurements will be applied as needed. Specimen fabrication (cutting, polishing) and glass blowing services will be provided. The application of these techniques will yield information on structure and crystallinity of materials, chemical composition, surface structure and composition and defect density and structure in both bulk and thin film materials.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

3.0018, RECLAMATION OF SYNTHETIC TURBINE ENGINE OIL MIXTURES

G.A. Beane, Monsanto Research Corp., *1515 Nicholas Rd., Box 8, Dayton, Ohio* 45407 (DF458700; F33615-76-C-2037)

Develop an effective method for reclaiming overaged and used synthetic turbine engine oil mixtures.

Survey industrial reclamation techniques. Identify and resolve problem areas and technical deficiencies. Develop a reclamation technique. Feasibility of the technique will be demonstrated by restoring at least one batch of used MIL-L-7808 engine oils to satisfactory performance criteria.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

3.0019, FRACTURE MECHANISMS IN FIBROUS COMPOSITES

P.W. Beaumont, University of Cambridge, *Hills Rd., Cambridge, England, United Kingdom* (DF052720; AFOSR-78-3644)

AF function - future high-performance flight vehicles will require improvements in structural efficiency. Deficiency - inadequate understanding of composite fracture exists when environmental exposure is considered. Objective - the objective of this research is to understand and develop a theory to predict fracture of advanced composites and hybrids under conditions of elevated temperature and moisture. How work contributes - this research contributes to the AF on-going effort in advanced composite structures technology.

Both theoretical and experimental efforts will be pursued under this research grant. Fracture mechanisms such as relaxation, debonding, pullout splitting, crasing, etc., will be studied under environmental exposure conditions. Both crack initiation and propagation behavior will be investigated. In addition, the behavior of hybrid composites will be considered. Fibers to be studied include glass, graphite and kevlar.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0020, HIGH-PRESSURE VISCOSITY MEASUREMENT

A. Cameron, University of London, Imperial College of Science & Technology, *Prince Consort Rd., South Kensington, England, United Kingdom* (DN575192; N00014-77-G-0071)

The objective of this work is to determine the influence of molecular structure on the time-dependent viscosity and density response of liquids and other viscoelastic materials. This data is needed in the design and development of rolling element bearing and gears for high-load, high-speed applications in equipment such as gas and helicopter transmissions.

The approach will be to measure densities and viscosities of the subject lubricants as a function of time at pressures up to 500,000 psi using the micro high-pressure optical viscometer and to correlate these properties with similar work at Catholic University.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, AUTOMATIC LAUNCHING/LOADING TECHNIQUES - HELICOPTER SYSTEMS

G.T. Lamar, U.S. Dept. of Defense, Army, Missile Research & Development Command, Technology Lab., *Redstone Arsenal, Huntsville, Alabama* 35809 (DA0F1401)

Investigate the depot-to-fire sequence of future systems and develop transport-load-launch-reload concepts minimizing manpower requirements and total sequence time for helicopter launch systems.

A full study of the techniques for rapid load and reload of helicopters will be conducted. Automatic boresighting features, self-loading hardback design, rough terrain loaders and techniques to satisfy the complete wooden round philosophy will be investigated. A tri-service/NATO survey will be conducted. Prototype hardware of promising concepts will be designed, developed, and tested.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, Ground Equipment & Missile Structures Directorate

4.0002, FILTRATION ELEMENT FOR FLUIDIC AND PNEUMATIC CONTROL AIR SUPPLIES

D.J. Schaffer, Signal Companies Inc., Airesearch Manufacturing Co, *402 S. 36th St., Phoenix, Arizona* 85034 (DN890123; N00019-78-C-0393)

Conduct a research and development project to investigate and develop design criteria for a pneumatic filtration device.

An investigation of filter requirements will be conducted and design criteria established based upon air pressures, flow rates, temperatures and contaminant levels of aircraft engine bleed air and compressor outputs. Based on these criteria, filtration components will be fabricated and tested for a specific aircraft application.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0003, COMPUTER ANALYSIS OF SHELLS AND COMPOSITES

D. Bushnell, Lockheed Missiles & Space Co. Inc., *3251 Hanover St., Palo Alto, California* 94304 (DF049730; F49620-77-C-0122)

AF function - advanced aerospace vehicles rely on highly efficient structure to achieve mission objectives. Deficiency - durability of advanced composite materials under operating environmental conditions is not well understood. In addition, a comprehensive guide to shell and panel structure modeling and analysis does not exist. Objective - this research program involves two task efforts. The objective is to determine both steady state and transient behavior of a composite laminate under exposure to moisture and high thermal states while establishing, at the same time, a comprehensive analysis and structural modeling guide for shell and panel structures. How work contributes -results of this effort will result in improved understanding and methods for highly efficient flight vehicle structures.

Task 1 - analysis techniques for determining thermal and concentration profiles in a laminate will be combined with standard finite element analysis techniques. Resulting analysis capability will enable both transient and steady state conditions to be treated. In addition, capability to handle viscoelasticity of matrix material will exist. With this tool major effort will be to investigate hygrothermal effects on residual stress, interlaminar stress and free edge, stress behavior. Task 2 - two factors enter into the correct choice and effective use of a computer program for the analysis of structures of which thin shells and panels are significant parts, (1) the engineer must understand the physics of the problem well enough to be able to define his needs, (2) the engineer must be informed which programs will satisfy these needs. This task addresses primarily the first factor. Emphasis will be placed on practical shell structures which may be stiffened, segmented, branched, discontinuous, have complex composite wall constructions. Descriptions will be provided of some of the peculiarities of the behavior of shells, nonlinear behavior due to plasticity and large deflections, stress redistribution effects, stiffener and load eccentricity effects, bifurcation buckling, local vs. general instability, imperfection sensitivity, low-frequency bending vs. high-frequency extensional dynamic response, and fluid-shell interaction effects.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0004, MEASUREMENT SYSTEM FOR HYDROGEN IN AIRCRAFT STEELS (BARNACLE ELECTRODE)

F. Mansfield, Rockwell International Corp., Science Center, *1049 Camios Dos Rios, Thousand Oaks, California* 91320 (DN881537; N62269-77-C-0351)

Since the laboratory phase of the development of the barnacle electrode has shown that the method is feasible for the measurement of low levels of embrittling hydrogen in high naval aircraft steels the object of this contract is to improve the design, fabricate and deliver three units of a prototype portable apparatus suitable for field use. This contract effort supports work unit DG202 Accession No. DN8330889.

The apparatus will be based on the laboratory model developed at NAVAIRDEVCEN. The electronics will be assembled from off-the-shelf items with circuitry which will not influence the electrochemistry of the system. The cell attachment will be accomplished by magnetic means and will have a well-defined and reproducible area. Testing of the system will be coordinated with NAVAIRDEVCEN personnel.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0005, RELIABILITY EVALUATION OF COMPUTER SYSTEMS

E.J. McCluskey, Stanford University, School of Engineering, Dept. of Electrical Engin, *Stanford, California* 94305 (DF047640; AFOSR-77-3325)

AF function - the design of digital avionics systems. Important functions in growing numbers are being performed by digital systems on USAF aircraft. The consequent demands for reliable computing require newer and better designs in electronic circuitry. Deficiency - the correct functioning of the computer system is crucial since malfunctions could have catastrophic consequences for an aircraft. Such ultra-reliable computers are not yet available. Objective - to develop general tools and unified principles and methods for evaluating the reliability of competing possibilities in the design of computer circuits so that the best system configuration can be chosen for the required application. How work contributes - the results of this research, if successful, would permit the construction of ultra-reliable computers which are essential for advanced technology aerospace vehicles.

The research will be performed in three concurrent efforts, viz., analytic modeling (applying mathematical probability theory), simulation, and experimentation with actual prototype fault-tolerant computers such as the prime and the slac triplex.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0006, ADVANCED TECHNOLOGY RESEARCH AND DEVELOPMENT FOR FLIGHT SYSTEMS PROBLEMS

C.T. Leondes, University of California, Los Angeles Campus, School of Engineering & Applied Science, Dept. of Engineering Systems, *405 Hilgard Ave., Los Angeles, California* 90024 (DF141870; AFOSR-78-3486)

Develop modern control technologies for application to advanced flight vehicles. Control configured vehicles will provide new dimensions in aircraft guidance and control. New flight control systems must be designed to efficiently integrate and effectively utilize the advanced capabilities of these aircraft. Basic research will be conducted to formulate a functional flight control design using optimal control and other advanced design techniques. The design will be intended for use on advanced aircraft with new control capabilities.

Conduct graduate theses research to develop the theoretical basis for advanced control systems. Modern control theories will be investigated for application to the air-to-air and air-to-ground combat problems and to precision trajectory tracking and end point attainment with environmental disturbance accommodation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0007, DEVELOP PROPAGATION MODELS AND COMPUTER PROGRAMS

Unknown, U.S. Dept. of Commerce, Office of Telecommunications, Inst. of Telecommunication Sciences, *Boulder, Colorado* 80302 (FA78WAI-840; FA161215 (TRAIS NO.))

Development of propagation models and computer programs is now complete. The FAA has found the ITS/FAA model to be a reliable tool for predicting air-to-ground radio propagation. The model's flexibility has made it an indispensable tool for solving day-to-day propagation-related problems. The FAA wishes to use the ITS/FAA model on an 'as needed' basis and to take advantage of the special expertise available at ITS for interpreting the results.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

4.0008, NITRIC OXIDE MEASUREMENT STUDY

Unknown, United Technologies Corp., *400 Main St., East Hartford, Connecticut* 06108 (FA77WA-4081; FA160442 (TRAIS NO.))

The Contractor shall design and construct a narrow-line UV-absorption nitric oxide (NO) system using a contractor-owned ultraviolet spectrometer and hollow cathode lamp in accordance with the general principles employed by Arnold Engineering Development Center (AEDC). The system shall be constructed such that it shall be capable of future use in full-scale combustor test rigs although in this program testing shall be limited to the testing specified in this Work Statement. The contractor-owned spectrometer and lamp shall not be delivered under this contract.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

4.0009, MULTIANGULAR SCANNING ABSORPTION-EMISSION TECHNIQUES FOR 3-D COMBUSTION DIAGNOSTICS

R. Goulard, George Washington University, Graduate School, *901 23rd St. N.W., Washington, District of Columbia* 20037 (DF049990; AFOSR-77-3439)

AF function - advanced diagnostic techniques, advanced air-breathing engines, weapon delivery and defense. Deficiency - inability to obtain reliable measurement of important parameters in turbulent reacting flows in practical hostile combustion environment via present-day measuring and diagnostic techniques, inability to reliably evaluate combustion models. Objective - to develop more sensitive selective, precise, reliable and rapid diagnostic methods for measuring important parameters in jet engine reacting flow environment. To determine feasibility of using multiangular scanning absorption-emission (MASAE) techniques for obtaining high spacial and time resolved 3-D mapping (point and profile) of species concentration and temperature in practical combustion environments, to determine capabilities and limitations of MASAE as a laboratory diagnostic tool, to provide reliable experimental data to the combustion modeler. How work contributes - will provide additional understanding and reliable data to permit realistic evaluation of analytical models of complex reacting flows, will help reduce development time and cost of air-breathing propulsion systems, will permit evaluation of capabilities and limitations of various diagnostic methods, will aid in development of improved or novel new in-situ nondisturbing techniques for accurately measuring turbulent reacting flow parameters.

The applicability of absorption-emission techniques as 3-D combustion diagnostics will be investigated. Using multiangular scanning, the traditional 'onion-peeling' method will be extended from axisymmetrical flows to arbitrary distributions of radicals and pollutants in reacting flows encountered in actual 3-D air-breathing combustion systems. A convolution algorithm already proven in X-ray absorption tomography will be tested on typical pollutant and radical concentration profile maps in flames or exhaust. The effect of the number of scans, of the viewing angle limitation, of the instrument noise, will be analyzed for both parallel and fan beams. An optimized design will be proposed on the basis of these observations which will enable accurate measurement of the reacting flow field. The concept of an emission technique based on the instantaneous measurement of two or three fans from two windows will also be evaluated which can provide an instantaneous map of temperature and species concentration. (Text Abridged.)

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0010, COMSTAR SATELLITE K-BAND PROPAGATION EXPERIMENTS 15012-GS

S.C. Bloch, State University System of Florida, University of South Florida, School of Natural Sciences, Dept. of Physics, *4202 Fowler Ave., Tampa, Florida* 33620 (DA0F9094; DAAG29-77-G-0224)

To assess the intensity, duration and directional properties of rain effects on space-to-earth propagation in the 19 and 29 GHz bands. Relevance - all the military services are relying heavily on the expansion of satellites for communication, navigation and other sophisticated military applications, which require the higher microwave carrier frequencies of 19 and 29 GHz. The primary obstacle to the use of the 19 and 29 GHz bands is the attenuation produced by intense rainfall.

To obtain and interpret long-term statistics on propagation path characteristics in intense rainfalls from a spatial diversity experiment using an array of three receiving ground stations augmented by rainfall measurements from rain gages and weather radar.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0011, UNSTEADY VISCOUS FLOW

J.C. Wu, Georgia Inst. of Technology, School of Aerospace Engineering, Dept. of Aerospace Engineering, *Atlanta, Georgia* 30332 (DN575103; N00014-75-C-0249)

The prediction of the gust response, dynamic stability and flutter characteristics of aircraft and missiles requires an accurate knowledge of unsteady aerodynamic flows. Because of the complex nature of such flows when viscous effects are important, coupled with the limited availability of reliable measurements, serious shortcomings exist in existing predictive methods. The objective of this research is to use numerical solutions of the Navier-Stokes equations to assess the assumptions, approximations, and ranges of validity of existing inviscid theories for oscillating airfoils.

In this research an integro-differential formulation of the incompressible Navier-Stokes equations will be used to compute the complete history of the viscous flow field development about an airfoil undergoing sinusoidal oscillations in sufficient detail to permit the delineation of the various flow features, including the periodic shedding of vortices and the accompanying change of circulation, and the periodic variations of pressure, forces and moments. Calculations will be made for a range of frequencies appropriate to aircraft and missile flight. Corresponding inviscid calculations will be used for assessment purposes.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0012, CALCULATION OF TIME-DEPENDENT FLOWS WITH REVERSAL AND SEPARATION 14039-EX

J.F. Nash, Sybucon Inc., *Atlanta, Georgia* 30339 (DA0E9166; DAAG29 76 C 0045)

To perform fundamental investigations on the behavior of unsteady compressible turbulent and laminar boundary layer and boundary layer-like flows experiencing local reversal and approaching full separation. The proposed investigation is directly relevant to the on-going program of research at the AMRDL on the analysis of dynamic stall of helicopter rotors.

An implicit numerical method based on the alternating direction method will be developed for calculating unsteady separating turbulent viscous flows which are described by the turbulent kinetic energy equation model. This tool will be utilized in describing the response of unsteady flows to changes in the governing physical parameters and boundary conditions.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0013, STUDY OF MUTUAL COUPLING BETWEEN TWO ANTENNA SLOTS ON A CONE

S.W. Lee, University of Illinois, Urbana Champaign Campus, School of Engineering, Dept. of Mechanical & Industrial Engineering, *2527 Hydrosystems Lab., Urbana, Illinois* 61801 (DN890036; N00019-78-C-0064)

Research study to investigate analytical techniques for determining the mutual admittance of antenna slots on a conducting cone.

The theoretical justification of the form of the asymptotic solution for the Green's function of a surface magnetic field, due to a $ magnetic dipole on a conducting cylinder has not been established, even though it agrees with the modal solution. Justification of this solution will be attempted by critically examining the exact modal solution for a cylinder and extracting rigorous asymptotic solutions of the form of a modified Fock solution. This is a necessary step to determining the Green's function for more complex shapes such as cones using geometric theory of diffraction techniques.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0014, SELECTED PROBLEMS IN SYSTEMS ENGINEERING

W.A. Porter, Louisiana State University, Agricultural & Mechanical College, Graduate School, *University Station, Baton Rouge, Louisiana* 70803 (DF050290; AFOSR-78-3500)

AF function - to analyze, design and synthesize electronics systems and aerospace vehicles. Deficiency - complex system engineering problems are continually encountered as a result of using system level approach to obtain maximum mission effectiveness in Air Force aerospace vehicles and support equipment, and as a result of integrating subsystem technology advances. Due to the complexity of the systems and of the appropriate theory available today, the problems are extremely difficult to solve. Objective - to improve the capability to handle these problems by providing a new and more powerful framework for engineering analysis and design. How work contributes - advances in the general theory of nonlinear operators will permit the design and construction of more powerful and cost-effective systems.

Research will continue into the diverse types of causality exhibited by models, into the class of systems represented by polynomic operators, and into the problem of approximating arbitrary causal systems by operators of a simpler type, such as polynomic.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0015, INTEGRATED THERMAL AVIONICS DESIGN

R.F. Porter, Westinghouse Electric Corp., *P.O. Box 746, Baltimore, Maryland* 21203 (DF140690; F33615-77-C-2074)

Avionics equipment accounts for a substantial share of weapon system ownership cost which is strongly driven by equipment reliability in the severe airborne environment. Ownership cost can be controlled by moderating environments and designing environmentally resistant equipment. Tools for designing avionics equipment in a life cycle cost context are needed to reach the minimum weapon system life cycle cost goal advocated by DOD directives. The objective of this effort is to make a quantum reduction in weapon system ownership cost by increasing the environmental resistance and protection and thus the reliability of avionic equipment.

Total program and costs will be defined in order to create a computer-aided design and analysis (CAD) capability in the areas of thermal design of avionics hardware. Constituent analysis tools will be identified that will provide visibility into the mutual influence of avionics system and the total weapon system with regard to physical characteristics, operational penalties, reliability, and life cycle cost. Design modules will be identified to develop compatible designs that permit an approach to a minimum life cycle cost design for the weapon system. The effort will include optimal thermal design and comparative cost analysis of multilayer circuit boards.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0016, FAR INFRARED LASER/SOURCE TRANSMISSION

M.J. Persky, Block Engineering Inc., *19 Blackstone St., Cambridge, Massachusetts* 02139 (DA0F2021; DAAB07-78-C-2438)

The lack of sufficiently spectrally resolved, true atmospheric transmission data in the submillimeter wave part of the spectrum presents a severe limitation in the evaluation of the potential of both active and passive submillimeter wave systems. This spectral region is characterized by strong molecular absorptions, mostly due to water vapor with attenuation as high as 10 to the fourth power decibel per kilometer. However, since scattering losses are greatly reduced, operation in 'windows' in the NMMW region can possibly result in improved operation under poor visibility conditions. It is the intent of this program to obtain high-resolution data under adverse high humidity conditions, to better define the absorption parameters necessary for accurate FIR laser systems performance.

An FIR Fourier transform spectrometer will be assembled capable of operating in the 100-2000 micron band. The spectral resolution will be 0.1 wavenumber. The instrument will be operated at Otis AFB, Cape Cod, Mass. over a period of two months. All necessary met parameters will be monitored. The data will have a time resolution of roughly 6 seconds. Transmission under adverse weather conditions will be the primary objective, with the windows' regimes of high transmission of main interest.

SUPPORTED BY U.S. Dept. of Defense, Electronics Research & Development Command, Night Vision & Electro Optics Lab.

4.0017, LASER DOPPLER AIRSPEED AND ALTITUDE SENSOR

M. Rudd, Bolt Beranek & Newman Inc., *50 Moulton St., Cambridge, Massachusetts* 02138 (DF051140; F49620-78-C-0023)

AF function - control of aircraft requires accurate sensing of speed and altitude over wide range of flight regimes. Opportunity -lasers allow optical sensing of air data where present mechanical means may fail or lose accuracy. This sensing occurs without flow field distortion, and renders inherently more accurate information. Objective - provide full-range velocity measurement capability (0 to Mach 10) in addition to angle of attack and - sideslip, pressure altitude and flight path acceleration data. How work contributes - extends present flight data capability at high altitude, hypersonic speed and in maneuvers. Complements present instrumentation, aids flight safety.

Laser light is focused in front of the vehicle in the undistorted flow region. Backscattered radiation from CO2 molecules at 4.3 micron resonance is collected. Laser tuning establishes spectroscopically scattered light frequency shift and linewidth, from which flight velocity and altitude are derived.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0018, OFF-DESIGN WAVERIDER FLOW FIELDS

J.R. Baron, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF048600; F49620-77-C-0090)

AF function - aerospace vehicles. Opportunity - waveriders are a special class of vehicles which utilize favorable interference in their optimization. Such optimization of favorable interference is generally 'point-optimal' design and off-design performance can degrade to the point of prohibiting the use of the concept. This effort proposes to concentrate on the off-design flow fields of this rather elemental geometry vehicle and thereby provide insight into the off-design behavior, not only of the waverider concept, but of favorable interference phenomena in general. Objective - develop a method which is capable of accounting for the off-design behavior of a generalized waverider configuration. How work contributes - this study is concerned with how to control the enhanced interference effects that are kn wn to be achievable with finite span geometries in so-called on-design situations. The focus of this effort is on flow field behavior and predictions. From such information performance changes should be apparent when there is a departure from the ideal (on-design) condition.

Finite-difference techniques will be used to obtain solutions to the inviscid equations of motion for waverider configurations. An examination will be made of changes in the flow field with Mach number or geometry in transition from near design to fully off-design conditions. At the end of the inviscid study, the inclusion of difference modeling for viscous regions adjacent to surfaces will be considered.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0019, ADSORPTION ON GRAPHITE SURFACES

M.S. Dresselhaus, Massachusetts Inst. of Technology, School of Engineering, Dept. of Electrical Engin, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF049500; AFOSR-77-3391)

AF function - airborne systems utilized for command, control, communications, reconnaissance and surveillance depend heavily upon interconnected electronic components. Opportunity - improved performance of these systems can be expected from the use of less expensive, lighter materials such as intercalated graphite compounds for electrical conductors. Intercalated graphite compounds, weighing about one fourth of that of copper, could have conductivities greater than that of copper. Objective - the objective is to contribute to the understanding of the basic physical properties of intercalated graphite compounds. How work contributes - this work should contribute to the develop-

ment of intercalated graphite compounds that could replace copper as the dominant electrical conductor for airborne systems.

Raman and infrared spectroscopy will be used to examine in detail the vibrational modes associated with both the molecules absorbed on surfaces and the absorbing substrates. The frequency shifts together with the observed Raman and infrared selection rules will be interpreted to yield information on the orientation of the absorbed molecules and on their ordering at the surface.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0020, FUNDAMENTAL MECHANISMS OF NONEQUILIBRIUM MHD LASING PHENOMENA

J.L. Kerrebrock, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, 77 *Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF043270; F44620-76-C-0067)

AF function - weapon defense and offense, advanced high-power lasers. Deficiency - lack of fundamental understanding of physical phenomena associated with MHD lasers and lack of experimental evidence defining capabilities of MHD generator to cause population inversion directly in a single cavity and laser power production from thermal energy sources without intermediate conversion to electric power. Objectives - to understand and develop accurate theoretical and mathematical models accurately describing the phenomena associated with nonequilibrium MHD laser processes. How work contributes - will provide additional understanding and realistic analytical modeling of the nonequilibrium MHD lasing phenomena and will contribute to the technology base required for realistic evaluation and development of such advanced laser devices.

Experimental and theoretical studies of the MHD laser process will be carried out. The MHD laser will be modeled by pulsed supersonic flow through a magnetic field of cesiated helium from a heated plenum chamber, the flow being along the axis of the optical cavity. All important parameters of the plasma will be properly simulated, including the flow Mach number, electron to gas temperature ratio, gas composition and Hall parameter. Diagnostics will include measurements of electric field and radiation from both electronically and vibrationally excited species so as to define the kinetic processes occurring during the pulse. The optical gain at 10.6 microns will be measured and the results correlated with the kinetic measurements. A numerical model of the MHD laser will be used to assess the overall performance. The model will include gas dynamic as well as gas kinetic phenomena.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0021, IMPROVED REACTION SINTERED CERAMICS FOR ENGINES

D.R. Messier, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center, *Watertown, Massachusetts* 02172 (DA0C4794)

The use of ceramic components in engines inevitably involves compromises between factors such as ease of fabrication and low cost vs. optimum corrosion, erosion, mechanical and thermal properties. The objective of this program is to develop improved, economical ceramic materials for future Army power generation and propulsion applications. Although this work is specifically related to the use of ceramic components in the meradcom 10 kw turboalternator, it also relates to pacing materials problems in aircraft (turbine components- 14.2, 15.2, 15.7, 15.11 in FY76 guidance), armored vehicles (combustor, power turbine, and regeneration for 1370 degrees C tit), and problems in surface mobility and craft and missile materials. The major thrust is cost reduction via fuel economy.

Although reaction sintered silicon nitride is attractive as an inexpensive, fabricable material for use in the nozzle and combustion chamber sections of the 10 kw turboalternator, its resistance to erosion and oxidation appears inadequate for such use. A coating technique that was investigated in a preliminary manner in a previous investigation appears promising for overcoming these deficiencies. Certain alloying additions such as titanium appear effective in promoting wetting of porous silicon nitride by silicon, thus allowing the formation of uniform metallic coatings on that material. These coatings may be used as is, or further nitrided to produce nitride coatings on silicon nitride. During the fiscal year, the coating process will be perfected, and the erosion, corrosion and mechanical properties of the coated materials will be determined. Also to be considered are other candidate materials such as sintered silicon carbide or silicon carbide composites.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

4.0022, FLOW VISUALIZATION AND HOT WIRE ANEMOMETRY STUDY OF TURBULENT SPOTS

R.E. Falco, Michigan State University, School of Engineering, Dept. of Mechanical Engineering, *Engineering Bldg., East Lansing, Michigan* 48824 (DF053460; AFOSR-78-3703)

AF function - aerospace vehicles. Opportunity - provide increased understanding of the role turbulent spots play in transition from laminar to turbulent boundary layer flows and in fully turbulent boundary layers. Objective - arrive at a consistent picture of the turbulent spot dynamics as well as spot formation and spreading mechanisms. How work contributes - new and improved prediction methods are needed for transition and fully turbulent flows by designers of advanced aerospace vehicles. This effort will provide insight on how the building blocks of turbulence are combined and how present analysis can be extended to non-flat plate flow fields.

The interior of turbulent spots will be examined in an air tunnel capable of continuous visualization using a fog of oil droplets. The boundary layer will be illuminated using laser light slices parallel and normal to the solid boundary and photographed either in a stationary or moving frame of reference using high-speed cinematography. Simultaneous hot-wire anemometry will also be taken. Air velocities up to 21 feet/sec and Reynolds numbers up to 10 exp 6 will be studied.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0023, NONLINEAR OPTICAL PHENOMENA IN SOLIDS

P. Kruse, Honeywell Inc., *2600 Ridgeway Parkway N.E., Minneapolis, Minnesota* 55413 (DF046920; F49620-77-C-0028)

AF function - secure space communications and covert optical electronics require devices which exploit special properties and interactions of materials with far infrared radiation. Opportunity -infrared materials research has a high potential impact on novel detectors, sources and communications for airborne and spaceborne applications. There is no established method for providing coherent radiation suitable for optical communication at any given wavelength out of 150 micrometers. A nonlinear optical effect is required. The Auger lifetime is the parameter which ultimately limits the performance of infrared detector materials. The theory of the Auger mechanisms needs to be further advanced in order to determine the fundamental material limits for infrared detectors. Objective - this research is a theoretical and experimental investigation of nonlinear optical effects in (Hg,Cd)Te for use in the generation of far infrared radiation. Also, it is a theoretical study of Auger recombination in (Hg,Cd)Te and related materials which provide basic information needed for cold-space back-ground detectors in the 15-30 micrometer spectral interval. Explore the synthesis and characterization of 'diamondlike' carbon thin films for infrared optical components. How work contributes - the interaction effects and unique properties of (Hg,Cd)Te should provide a basis for developing useful tunable, far infrared sources for adverse weather communications and radars, infrared spectroscopy and plasma diagnostics as well as for far infrared detectors and sensors and other electro-optical aerospace applications.

The spontaneous linewidth, fine tuning behavior, spatial uniformity, difference frequency generation by spin nonlinearities, resonant four-photon mixing are being investigated in (Hg,Cd)Te spin-flip Raman lasers as a useful source of tunable coherent far infrared radiation. Auger lifetimes for heavy and light hole transitions and for degenerate statistics are being calculated to determine the dominant mechanism for Auger recombination in p-type materials. Study the parameters involved in the

plasma arc ion beam deposition of 'diamondlike' carbon thin films and establish correlations between composition, growth method, crystallography microstructure and physical properties.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0024, STUDY OF THE EMP INTERACTION WITH AIRCRAFT OVER AN IMPERFECT GROUND PLANE

C.D. Taylor, Mississippi State University, School of Engineering, Dept. of Electrical Engin, *Suite 101 Engineering Bldg., Mississippi State, Mississippi* 39762 (DF048890; AFOSR-77-3342)

AF function - an electromagnetic pulse such as the nuclear EMP incident on an aircraft will induce current and charge densities on its surface. The interior fields are related to the exterior fields and a knowledge of the external fields is the first step in determining the currents and voltages induced in the electrical systems of the aircraft. Simulation facilities to test the response of aircraft to the nuclear EMP generally require that the aircraft rest on a concrete pad which eliminates the possibility of testing the inflight response. Theoretical models are required to extrapolate the test data from ground-based measurements to predict the inflight response. Deficiency - models are available to predict the induced current density on metallic objects and, generally, the flight mode can be handled. Agreement for the ground alert mode is not as good and proximity to an imperfectly conducting ground plane has not been treated at all. Objective - the singularity expansion method (SEM) will be applied to determine the current and charge induced on models of aircraft (intersecting cylinders and intersecting bodies of revolution) near a ground plane. Contribution -this work will provide usable analytical models for predicting the EMP response of aircraft-like objects located in proximity to an imperfect ground plane. This is an important step in the goal of extrapolating test data to the free-flight mode.

Four tasks will be undertaken - 1) a parametric singularity expansion method (SEM) study of two perpendicular intersecting cylinders parallel to a perfect ground plane. The parameters will include aircraft-like dimensions and heights above the ground plane. Natural modes, natural frequencies, coupling vectors and coupling coefficients are to be obtained. Time domain results will also be obtained. 2) SEM results for two perpendicular intersecting bodies of revolution parallel to a perfect ground plane are to be obtained and compared with the previous results. 3) SEM results for two perpendicular intersecting cylinders parallel to an imperfect ground are to be obtained using the exact Sommerfeld formulation. Aircraft-like dimensions and heights above the ground plane with typical electrical parameters are to be considered. A comparison with the results for a perfect ground plane will be made, and 4) the time domain results will be verified with corresponding results.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0025, RELIABILITY TEST AND EVALUATION OF MIL-M

G. Johnson, McDonnell Douglas Astronautics Co., *E. 411 St., St. Louis, Missouri* 63166 (DF736730; F30602-76-C-0371)

The objective of this effort is to provide a detailed study of high reliability (MIL-M-38510 class B or if not available, the nearest equivalent) linear microcircuits to assure adequate test methods, reliability prediction, and specification for high-reliability Air Force electronics.

The program will test statistically significant quantities of several types of linear microcircuits using standard reliability test techniques and MIL-M-38510 type test conditions to obtain data of estimated device failure rate, temperature/voltage acceleration factors and identify all observed failure mechanisms in detail. The test vehicles shall include operational amplifiers, voltage regulators and voltage comparators as a minimum. A comparative analysis of the effectiveness of the various burn-in configurations shall be done to determine the best approach where several alternatives are available. The electrical test procedures of MIL-M-38510 shall be studied in detail to define any problem areas and inadequacies which may exist. Consideration shall be given to problems often encountered when implementing parametric tests in an automated environment such as test time, sequence, soak time, and test fixture wiring restrictions. The approach shall include selection of specific test vehicles from several sources, design of test plan and evaluation of part performance using conventional and special test methods including high-stress tests. Analysis of device construction and detailed failure analysis shall be done.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0026, KE AMMUNITION - TUBULAR PROJECTILES

E.T. Malatesta, U.S. Dept. of Defense, Army, Armament Research & Development Command, Fire Control & Small Caliber Weapon Systems Lab., *Picatinny Arsenal, Dover, New Jersey* 07801 (DA0N0146)

To assess the potential of tubular projectiles for Army application by determining their aerodynamic and lethality characteristics.

Tubular projectiles of various calibers from 20 to 40mm will be fabricated and tests conducted to obtain inflight aerodynamic and penetration characteristics. At present only wind tunnel aerodynamics and extremely limited penetration capability are available.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Fire Control & Small Caliber Weapon Systems Lab.

4.0027, AERODYNAMIC PROBLEMS OF LARGE-SCALE COOLING DEVICES

F.K. Moore, Cornell University, Ithaca Campus, School of Engineering, Dept. of Mechanical & Aerospace Engineering, *242 Carpenter Hall, Ithaca, New York* 14853 (ENG7602516A02)

This basic study on dry cooling systems will be in part concerned with the viscous flow in an infinite stack of zig-zag plates intended to represent a yawed heat-exchanger array. In particular, various corner configurations will be investigated and heat transfer rates in corner regions will be predicted. A different but related approach to the yawed heat exchanger problem will emphasize the limit of high drag. Classes of devices intended to accomplish reversible turning at 'bundle' entrance, and irrotational flow at bundle exit will be studied. A general concept for best arrangement of heat exchanger bundles in a cooling-tower entrance will be developed, based on smooth bell-mouth entrance flow, and studies of wind-generated swirls in tower entrance flows, already begun, will be completed. More elaborate studies on exit flow will be undertaken in a wind tunnel and a water tank with a travelling jet. Also considered will be innovative flow devices, such as external ring airfoils, for the control of aerodynamic nonuniformities. This will be a continuation of NSF Grant No. ENG 76-02516.

SUPPORTED BY U.S. National Science Foundation, Div. of Engineering

4.0028, THEORY AND APPLICATION OF UNSTEADY FLOWS

S.F. Shen, Cornell University, Ithaca Campus, School of Engineering, Dept. of Aerospace Engineering, *242 Carpenter Hall, Ithaca, New York* 14853 (DF038390; AFOSR-74-2659)

AF function - advanced aerospace vehicles and airbreathing propulsion systems. Opportunity - increase our understanding of unsteady flows, i.e., flows that vary significantly with time. Objective -continue study of unsteady boundary layers. Areas of emphasis will include separation and flow through turbomachinery. How work contributes - will provide analytical methods capable of solving specific unsteady flow problems.

An analytical approach to time-dependent flows will be pursued. Computations for a class of semi-similar problems will be done in order to develop an approximate method which can be used as a tool for handling certain classes of unsteady flow problems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0029, FATIGUE RESISTANCE CRITERIA FOR LAMINATED COMPOSITE STRUCTURES 12825-E

G.J. Dvorak, Duke University, School of Engineering, Dept. of Civil Engin, *Durham, North Carolina* 27706 (DA0H5573; DAAG29 77 G0113)

To study analytically and to verify experimentally the fatigue strength of composites under cyclic mechanical and thermal loads. As pointed out by one of the Army laboratory reviewers, composites are the key to the development of lightweight, high-performance weaponry and the most important factor in such materials is their fatigue performance, particularly low cycle fatigue. This applies particularly to helicopter structures.

Analytical methods will be used in the solution of the thermoplasticity and shakedown problems, avoiding whenever possible excessive numerical solutions. Among these methods will be (a) classical thermoplasticity theory, (b) finite-element techniques, (c) mathematical programming for shakedown analysis, (d) extension of previous techniques to elastic-plastic laminates. These methods and experimental studies will be made on 0-90, 0 plus or minus 45, 0 plus or minus 60 deg. laminates for boron-aluminum, graphite-aluminum, and graphite-magnesium systems.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0030, FLUID DYNAMICS OF MULTIPLE NOZZLE ARRAYS AND RADIAL FLOW DIFFUSERS IN SUPERSONIC FLOWS

J.D. Lee, Ohio State University, Columbus Campus, School of Engineering, Dept. of Aeronautical Engin, *190 N. Oval Dr., Columbus, Ohio* 43210 (DF042820; AFOSR-76-2956)

AF function - weaponry and aerospace vehicles. Opportunity -improvement in understanding of two aspects of fluid mechanics of gas lasers. These are the diffuser-ejector region, and the turbulent mixing of supersonic streams of reactants. Objective - to gain more basic understanding of the details of mixing between coplanar supersonic streams of dissimilar gases, and to gain a more basic understanding of the flow field in a short, multi-channel diffuser with mixing from local multiple ejectors. How work contributes - this program will provide information useful in the design of high-power gas flow lasers.

Coplanar and cylindrical multi-channel supersonic nozzle arrays will be used to supply simulated lasers cavities, both cold and heated, which will be processed through diffuser systems with and without local ejector nozzles. The latter will be used both for bo st-pumping and for local boundary layer control. An arc heated wind tunnel fitted with two coplanar supersonic nozzles with separately controlled supply plenums will be used for the mixing study. Temperature turbulence in the mixing region will be monitored on a time-resolved basis by means of electron beam spectroscopy. Sources of turbulence in the flow field will be identified and their importance defined. Methods for measuring the time-resolved vibrational temperature of the gas will be investigated. Theoretical modeling of two-stream mixing flow and of ejector pumping flow will be extended.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0031, COMMUNICATIONS - A FUNDAMENTAL INVESTIGATION OF A HYBRID THEORY FOR GENERAL ELECTROMAGNETIC SCATTER AND ANTENNAS

G.A. Thiele, Ohio State University, Columbus Campus, School of Engineering, Dept. of Electrical Engin, *190 N. Oval Dr., Columbus, Ohio* 43210 (DN675287; N00014-76-C-0573)

The objective is to develop a general theory, valid at the high-frequency limit, the low-frequency limit, and near resonance to determine antenna impedance and radiation patterns from bodies of complex shape such as Navy ships, aircraft, and missiles. The theory simplifies treatment of sl t antennas and conformal slot arrays, as well as calculati n of radar cross sections of bodies with wire or rod appendages such as satellites.

The method of moments theory and geometric theory of diffraction are being combined into a unified hybrid theory. The method of moments is being extended by separately determining the contributions to the impedance matrix in the spatial regimes where the method of moments and geometric theory of diffraction respectively apply. The geometric theory of diffraction is being extended by using the method of moments to represent the current near a discontinuity in a surface, such as the edge of a wing.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0032, CHARACTERIZATION OF ION IMPLANTED COMPOUND SEMICONDUCTORS

E.T. Rodine, Systems Research Lab. Inc., *500 Woods Dr., Dayton, Ohio* 45432 (DF104990; F33615-76-C-1166)

Present solid-state microwave and opto-electronic devices employed in AF avionics systems require improved reproducibility and reliability. One specific application of output from this research is to improve the performance of such devices by applying ion implantation to the material preparation and device fabrication. The objectives of this experimental program are to characterize ion implanted epitaxial and substrate compound semiconductors such as gallium arsenide (GaAs), indium phosphide (InP), gallium phosphide (GaP), and other related compounds and to assess the utility of ion implantation techniques for device fabrication and development of bulk and thin-film GaAs, InP, and GaP materials for microwave, high-speed logic and electro-opitcal device applications.

The work will utilize ion implantation as a principal technique for doping materials with a wide variety of ions in a reproducible manner. This is a thorough program in which (1) the pre-implanted material is carefully characterized, (2) the implantation process is precisely controlled and analyzed with suitable techniques as needed, (3) the implanted layers are characterized by capacitance-voltage (c-v), differential Hall, distributed resistance capacitance (RC) measurements and deep-level trap spectroscopy (DLTS). Emphasis will be placed on the investigation of the electrical properties of the implanted layers which are pertinent to device fabrication. Different contacting strategies for the production of high-quality ohmic contacts such as the production of highly doped contacting layers by implantation and the use of heavy ion surface radiation damage as a prelude to contact formation will be evaluated.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0033, III-V COMPOUND SEMICONDUCTOR IMPURITY AND DEFECT INTERACTIONS AND ANALYSIS

Y.S. Park, U.S. Dept. of Defense, Air Force, Avionics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF104070)

Air Force avionics systems require basic electronic components employing semiconductors such as GaAs and other III-V compounds. At present, characteristics of impurities and defects, and their interactions in III-V compounds are not well understood. The objective of this program is to research support to the AF effort to develop advanced, reliable, and radiation-hardened solid-state opto-electronic and microwave devices. The specific goals are to obtain information about the physical properties of impurities and defects through better characterization and control of the impurities and defects introduced into the materials. In addition, the research will provide info on new doping techniques needed for solid-state device fabrication from III-V compound semiconductors. This program is in support of AF effort to develop materials characterization techniques and apply toward the characterization and development of bulk and thin-film GaAs, InP and GaP materials for microwave, high-speed logic, and opto-electronic device applications.

Impurities and defects which alter electrical and optical characteristics of the materials, are introduced into selected III-V and related compound semiconducting single crystals in a controlled manner by ion implantation and electron bombardment. Standard techniques such as measurements of electrical conductivity, Hall effect, photoconductivity, reflectivity, absorption, and luminescence are intensively employed to characterize the electrical and optical properties of ion implanted and electron irradiated crystals. Coupled with these measurements, the techniques of electron paramagnetic resonance (EPR), nuclear

magnetic resonance (NMR), electron nuclear double resonance (ENDOR) are used to probe the type of radiation damage centers created by bombardments and other types of grown-in and diffused-in centers. Glow discharge optical spectroscopy (GDOS) and Auger electron spectroscopy are used to learn the depth profile and location of the implanted atoms.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0034, E-O IMAGING SENSOR EVALUATION TECHNIQUES

W.R. Pershing, U.S. Dept. of Defense, Air Force, Avionics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF097420)

Standardized techniques are non-existent for the evaluation of optical materials, components and optical systems utilized in reconnaissance, surveillance and weapon delivery. Due to the complex and unique configuration of these optical sensors, new measuring and analysis procedures and techniques must be devised. This work unit serves the electro- ptical facility as the principal activity for establishing and maintaining an inhouse capability consisting of both a technology base and personnel experience in the measurement and analysis of optical systems, (1) to guide advancements in reconnaissance and weapon delivery systems, (2) to assess their impact upon present and planned systems, and (3) to serve as an AF and DOD center of excellence to measure and troubleshoot optical devices and problems in various stages of system development and utilization.

This work unit is oriented to provide for the investigation and establishment of optical measurement and analysis techniques in the visible and infrared spectral regions. Principal attention is given to evaluation and analysis techniques for infrared imaging sensor systems and components which function in the 3/5 and 8/14 micron spectral region. Areas of investigative activity are (1) develop standardized procedures and acquire instrumentation for evaluation of EO sensor systems such as TV and FLIR imaging sensors, (2) establish optical design analysis capability for system parameters such as MTF, Narcissus, static and dynamic environmental effects and tolerance analyses, (3) develop interferometric instrumentation for component and system analysis, (4) establish standardized procedures and instrumentation for improved OTF measuring capability, (5) establish a capability for measurement and analysis of focal plane arrays utilized in EO imaging sensors.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0035, EXPERIMENTAL RESEARCH OPERATIONS

M.E. Hillsamer, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF133130)

Experimental test facilities are required for the support of research efforts in fluid mechanics, propulsion and the aerodynamics of military aircraft and missiles. Fundamental concepts relating to weaponry utilize test facility data for validation, and input is required for checks on analytical and computational methods in fluid dynamics. It is the objective of this work unit to provide operational support for the research facilities and develop improved instrumentation and testing techniques.

Conduct experimental aerodynamic and fluid dynamic research studies in support of other in-house work units under projects 2307 and 1366 using facilities that span the range from Mach 3 to 14 with emphasis on tests in the Mach 6 high Reynolds number facility. Support will also be provided to AFAPL efforts in facilities that share equipment and utilities with the AFFDL-owned wind tunnels, such as the combustion test facility and the compressor test facility.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0036, TURBULENT FLOW RESEARCH

J.H. Lee, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF136480)

Turbulence is an unsolved problem in fluid mechanics, yet one confronts it in every aerodynamic work. For this reason, we are maintaining a long-range program for understanding the basic mechanics of turbulence and thereby developing new techniques that can be implemented to the engineering type of shear flows. At present, we are investigating the anisotropic effects in homogeneous turbulence. This is a first step toward formulating a deductive theory of shear flows. Also, engineering science techniques are being applied to Air Force applications.

Technically speaking, the rigorous treatment of turbulence involves statistical mechanical approaches, stochastic simulation, and model approaches of constructing dynamic equations which share certain features of the Navier-Stokes equations. Deterministic and stochastic solution techniques are used for various aircraft design problems, such as the turbulent gust load, angular vibration, and holographic interferometry.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0037, AIR CUSHION SYSTEM DEVELOPMENT/TEST/EVALUATION

J.T. Steiger, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF140720)

This effort supports the development of air cushion landing system (ACLS) and air cushion system (ACS) technol gy for application to various systems, such as the launch and recovery of remotely piloted vehicles (RPV's), the development of an alternate aircraft takeoff system (AATS) for battle-damaged runways, and future aircraft designs. A coordinated research program to dev lop and verify ACS theory required for ACS investigations does not exist. The objectives of this effort are to develop in-house test apparatuses to conduct investigations to expand the technology base and to apply his ACS technology to specific designs. The expansion of ACS techn logy will provide a cost-effective alternative for such applications as launch and recovery of existing and next-generation RPV's, the development of AATS, and a takeoff and landing system for tactical assault and future high gross weight aircraft.

Test rigs will be designed, fabricated and installed. Then, testing will be accomplished to check out the validity of the simulation provided by the test rigs. Subsequent testing on these rigs will be done in support of the following named systems - (1) RPV ACS concepts definition and initial development, (2) resolution of XC-8A/ACLS p0oblems, (3) fighter aircraft AATS concept definition and initial development, and (4) future application studies.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0038, UNSTEADY SWIRLING FLOWS IN GAS TURBINES

M. Kurosaka, University of Tennessee, Central Office, Space Inst., *Tullahoma, Tennessee* 37388 (DF051590; F49620-78-C-0045)

AF function - advanced turbomachinery. Opportunity - improve ability to predict aerodynamic forces inside turbomachinery. Objective - acquire fundamental understanding of phenomenon characterized by violent fluctuations occurring in swirling flows inside turbomachinery. How work contributes - will provide explanation for this complex problem and contribute to assuring that adequate design margins are incorporated in future designs.

In the first phase, which covers the first two years, a theoretical investigation will be conducted. The governing parameters shall be identified and the relationship between them determined. Both linearized and nonlinear wave theory will be utilized.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0039, LOW-DRAG AIRFOIL DESIGN UTILIZING PASSIVE LAMINAR FLOW AND COUPLED DIFFUSION CONTROL TECHNIQUES

R. Mark, Advanced Technology Center Inc., *P.O. Box 6144, Dallas, Texas* 75222 (DN881476; N62269-77-C-0442)

To design a low-drag airfoil utilizing passive laminar flow and coupled diffusion control techniques to obtain improved lift to drag ratios for advanced subsonic aircraft applications. This contract supports work unit NN701, Agency Accession NO. DN 481077.

2-D airfoil will be designed with the front part contoured to maintan laminar flow ATC at 80 percent upper surface and Stratford diffusion contour at lower rear surface. Design transition 80 percent upper and 70 percent lower. The design will be tested in an air boundary layer channel.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0040, HT PP 78-06 - ENGINES HEAT REJECTION ANALYSIS

P. Chesser, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Applied Technology Lab., *Fort Eustis, Newport News, Virginia* 23604 (DA0E3809)

The objective of this planned in-house effort is to determine the effects on engine cooling requirements and performance which would result from reduction of heat rejection by various insulation techniques, compartmentalized cooling, and engine case design techniques.

The task will involve a review of (1) UTTAS and AAH compartment cooling data, (2) data relative to maximum and minimum allowable temperatures and (3) Air Force, Navy and commercial procedures for handling heat rejection as it relates to temperature critical controls and accessories.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

4.0041, PREDICTION OF PROJECTILE MAGNUS EFFECT 13408-EX

I.D. Jacobson, University of Virginia, School of Engineering & Applied Science, Dept. of Aerospace Engineering, *Garrett Hall, Charlottesville, Virginia* 22903 (DA0E9003; DAAG29 76 G0126)

To study the effect of spin rate and angle of attack on the transition of, and subsequent growth of, the boundary layer on a variety of projectile shapes in both subsonic and supersonic flow fields. The investigation is directly relevant to the magnus research being conducted at both the Ballistic Research Laboratory and Picitinny Arsenal for designing stable, long-range and accurate artillery projectiles.

Both analytical and numerical analysis techniques will be developed for the laminar boundary layer, the transition line, and the turbulent boundary layer for arbitrary spinning bodies at angle of attack. The resulting magnus effect due to asymmetry in shear stress and displacement thickness will be calculated.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0042, ORBITAL PHOTOGRAMMETRIC TRIANGULATION WITH TRANSLATIONAL AND ROTATIONAL DYNAMICAL CONSTRAINTS 13794

J.L. Junkins, University of Virginia, School of Engineering & Applied Science, Dept. of Aerospace Engineering, *Garrett Hall, Charlottesville, Virginia* 22903 (DA0E9282; DAAG29 77 G0018)

To develop improved methods for orbital phalogrammetric triangulation which has a potential for resulting in improved prediction aspects of the orientation of the spacecraft. Relevance - accurate mapping and point positioning have obvious relevance to a variety of military activities. The planned work shows promise of contributing to a better capability for controlling photogrammetric procedure from spacecraft. Engineer topographic laboratories and Defense Mapping Agency scientists have attested to the relevance of the proposal.

Methods will be developed to reduce the number of unknown parameters and thus simplify the consideration of the translationally and rotationally constrained variables of a camera in space. The central new idea is that the rotational motion of the camera (spacecraft fixed) must be a rigorous solution of the spacecraft's rotational equations of motion.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0043, FLUCTUATIONS IN GEOPHYSICAL AND BOUNDARY LAYER FLOWS

W.O. Criminale, University of Washington, School of Arts & Sciences, Dept. of Oceanography, *Seattle, Washington* 98105 (DF019810; AFOSR-78-3655)

AF function - advanced aerospace vehicles. Opportunity - gain a better understanding of the underlying concepts of fluctuations and energy transfer in a stratified medium such as the atmosphere. Objective -develop an understanding of turbulence in the atmosphere and factors influencing transitions from laminar to turbulent flow. How work contributes - improvement in understanding of atmospheric structure and fluctuations such as clear air turbulence will permit better design of aerospace vehicles in which these factors could be limiting or controlling factors.

Analytical and numerical methods will be used to study the hom geneous stability problem for the turbulent Ekman boundary layer with emphasis to the details of stabilizing the flow. Wave packet analysis for the Ekman boundary layer and stratified flows will be examined.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0044, TURBULENCE AND SHEAR LAYERS IN HIGH-ENERGY LASERS

D.A. Russell, University of Washington, School of Engineering, Dept. of Aeronautics & Astronautics, *206 Guggenheim Hall, Seattle, Washington* 98105 (DF036570; AFOSR-77-3450)

AF function - weaponry, aerospace vehicles. Deficiency - high-energy lasers encounter a number of difficult problems in high-speed gas flow. Among these are nozzle flows, mixing layers and wakes with and without chemical reaction, and shock wave patterns downstream of multiple nozzles. All of these flow features, as well as many others, affect laser performance in terms of power output, gas consumption, beam quality and coherence. More detailed understanding of these phenomena is needed in order to optimize designs of gas flow lasers. Objective - to investigate nozzle flows, mixing regions, shear layers, and wave patterns downstream of multiple supersonic nozzles, and to relate these phenomena to laser performance. How work contributes - detailed quantitative understanding of the fluid flow features in lasers will make possible the rational use of design trade-off methods to optimize practical high-power gas flow lasers.

A combined experimental and analytical program is being conducted. The current extension of the work will include study of reacting mixing layers, experimental study of the flow downstream of an array of mixing nozzles, further refinements and simplifications of the present wave calculation procedures, and fluid mechanical problems of multi-pulsed lasers.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0045, ANALYSIS OF HIGH-POWER COMPOSITE ENGINE PERFORMANCE

R.D. Buhler, Universitat Stuttgart, Institut fur Raumfahrtantriebe, *80 Pfaffenwaldring 31, Stuttgart, Federal Republic of Germany* (DA0C9362; DAER075G001)

The proposed aerothermochemical analysis considers composite propulsion systems combining rocket and airbreathing components for special missions with greatly changing flight conditions, high acceleration requirements and/or V/STOL capability.

The performance capabilities of selected system configurations of this group are to be compared for simplified prototype mission-profiles on the basis of the aerothermodynamic performance results combined with estimated system weights.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Research & Standardization Group

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production and Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, REMOTE WIND MEASUREMENT USING ACOUSTIC ANGLE-OF-ARRIVAL TECHNIQUE 13850-GS
P.B. Russell, S R I International, *300 Ravenswood Ave., Menlo Park, California* 94025 (DA0F9186; DAAG29-78-C-0009)

To investigate the feasibility of the acoustic angle-of-arrival technique for remote wind profile measurements. Relevance - the acoustic angle-of-arrival technique has good potential to provide remote wind profile measurements over the spatial and temporal scales required for Army aircraft operations, defense against CB attack, smoke screening, low-altitude paradrops, and ballistic corrections for tube artillery and rockets.

Compare wind profile measurements obtained with an array of acoustic transmitters/receivers with wind, temperature and turbulence profile measurements from the Sutro Tower in California and the NOAA/NCAR Joint Meteorological Observation Facility Tower in Colorado. Under a variety of atmospheric conditions, investigate the effects of refraction of acoustic ray paths by temperature variation, destruction of phase coherence by turbulence, and loss of acoustic return signal (relative to background noise) on accuracy and operational effectiveness of the technique.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

5.0002, SEASAT
L. Fedor, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab., *Boulder, Colorado* 80302 (8B326351)

PROJECT OBJECTIVE: 1. To develop and test techniques for measurement of sea state using the satellite altimeter. 2. To assist in analysis and interpretation of real and synthetic aperture images of ocean waves as they impact on the SEASAT instrument. 3. To participate in SEASAT committees and workshops which provide guidance in the effective utilization of the radar instruments.

CURRENT YEAR PLAN: 1. Verify algorithms on initial data from the SEASAT-A altimeter. 2. Study effect of large-scale surface features on radar pulse returns and estimates of sea state especially in regions of strong surface currents. 3. Comparison of significant wave height determinations with surface truths especially for tracking of severe storms. 4. To develop and analyze technique for interpretation of imagery radar wave records. 5. To participate in SEASAT committees, workshops, and joint experiments with AOML.

PROGRESS REPORT: Completion of algorithm development modified for SEASAT altimeter characteristics and implemental computer programs.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab.

5.0003, STRATOSPHERIC ANALYSIS
Unknown, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Weather Service, National Meteorological Center, *5200 Auth Rd. S.E., Washington, District of Columbia* 20023

OBJECTIVE: To produce the most accurate objective meteorological analyses from 70 mb to 0.4 mb.

STATUS: Northern Hemisphere operational analyses at 70, 50, 30, and 10 mb are produced once daily, primarily with the use of radiosonde data.

Analyses for the Southern Hemisphere (70, 50, 30, and 10 mb) have been produced operationally since the middle of 1978. Satellite temperature profile data from VTPR are primarily used.

Daily operational analyses at 5, 2, 1, and 0.4 mb were also initiated for both hemispheres during 1978. Radiosonde, rocketsonde, and satellite data from the VTPR instrument are used as a basis for these analyses.

PLANS FOR FY79: (1) The feasibility of using presently developed tropospheric optimum interpolation analysis methods as a basis for a new stratospheric analysis system will be investigated further. (2) Evaluation of analysis accuracies will continue. Consideration will be given to tuning, data-checking and adaptation of TIROS-N data inclusion.

SUPPORTED BY U.S. Dept. of Commerce, National Weather Service, National Meteorological Center

5.0004, ENVIRONMENTAL REMOTE SENSING
V. Noble, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN220082)

To determine experimentally the necessary remote sensors and techniques which are applicable for improving oceanographic monitoring and prediction. Coordinate remote sensing studies with the objective of satisfying Navy Environmental Remote Sensing Program (NERSP) needs. FY 78 and 79 efforts are directed toward the Navy operational requirement (or) for satellite measurement of oceanographic parameters (SMOP).

Utilize electromagnetic sensors, both passive and active, to determine quantitatively the accuracies with which sea surface temperature, surface winds, wave heights, topography and other sea surface parameters can be measured to insure that the measurements and techniques are fulfilling NERSP's needs.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

5.0005, GLOBAL ATMOSPHERIC MEASUREMENTS EXPERIMENT ON TROPOSPHERIC AEROSOLS AND GASES
D.D. Davis, Georgia Inst. of Technology, School of Geophysical Sciences, *Atlanta, Georgia* 30332 (ATM7823598)

This grant funds the third year of the Global Atmospheric Measurements Experiment on Trace Aerosols and Gases (GAMETAG) project. During the first two years a total of 235 hours of flight time was logged on the NCAR Electra research aircraft by a cooperating group of scientists from several universities and from NCAR. The experiment is the first such coordinated effort to obtain data over a wide geographic area on the concentrations of a large number of atmospheric gases and aerosols, along with measurements of the ultraviolet solar flux and key meteorological parameters. During the third year of the project the data will be analyzed and archived, improvements will be made to the laser-induced-fluorescence detection system (which is used to measure atmospheric hydroxyl radical concentrations) and planning for a possibie second series of flight operations will be concluded.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0006, TROPICAL CLOUD REGIMES
T. Takahashi, University of Hawaii System, Hilo Campus, Cloud Physics Observatory, *P.O. Box 1357, Hilo, Hawaii* 96720 (DN775082; N00014-77-C-0031)

The objective of this research is to derive from field observations and modeling of both the shallow trade wind cumulus and the deep tropical cloud the critical cloud drop size distributions that seem to lead to the cloud precipitation process. Results would apply to improvement of the mesoscale weather forecast in the tropics and subtropics.

Light aircraft and surface observations below tropical and trade wind cumulus are conducted along with modeling and laboratory work. The sites of the cloud observations are Hawaii for the shallow trade wind cumuli, and Ponape for the deep tropical clouds.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0007, NAVY ENVIRONMENT - NEARSHORE ZONE MORPHOLOGY
E.H. Owens, Louisiana State University, Agricultural & Mechanical College, Coastal Studies Inst., *University Station, Baton Rouge, Louisiana* 70803 (DN775193; N00014-75-C-0192)

The objective of the proposed research is to derive quantiative functional relationships between shallow water processes and nearshore morphology in terms of the major controlling forces and the major variations in nearshore forms. This research can provide basic new understandings of the coastal environments in which a variety of Navy/Marine Corps operations may be undertaken.

This research will involve a field investigation which will be undertaken in two phases. During the first phase, morphometric variability will be defined through the use of topographic maps, nautical charts, aerial photographs, and a field reconnaissance. The second phase will follow with extensive observations of the field site using echo-sounding profiling, nearshore current and wave measurements, bottom sediment sampling, and scuba observations. The field site will be the eastern coast of Nicaragua.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0008, EVALUATION OF NEW REMOTE SENSING INSTRUMENTATION OF AGRONOMIC CROPS

J.H. Elgin, U.S. Dept. of Agriculture, Federal Research Office, Plant Genetics & Germplasm Inst., Field Crops Lab., *Bldg. 001, Room 335, Beltsville, Maryland* 20705 (0044246; 1108-20100-003)

OBJECTIVE: Undertake cooperative research with NASA scientists in identifying optimum parameters for making equipment recommendations for satellites and space shuttle. Develop remote sensing and monitoring techniques on agronomic crops.

APPROACH: In consulation with NASA scientists, develop field cropping systems for remote sensing reflectance experiments. Detailed agronomic data will be collected for all cropping systems and correlations with NASA remotely sensed spectral measurements will be determined. Based on results of this research, recommendation for new remote sensing equipment will be made.

SUPPORTED BY U.S. Dept. of Agriculture, Federal Research Office, Beltsville Agricultural Research Center

5.0009, CORONAL HOLE MODEL STUDY

G.L. Withbroe, Smithsonian Institution, Astrophysical Observatory, *60 Garden St., Cambridge, Massachusetts* 02138 (DF248110; F19628-76-C-0281)

AF function - communications and navigation. Deficiency - communication fading, and timing errors. Objective - to model the solar source regions (coronal holes) of the high-speed solar wind streams which create disruptive geomagnetic disturbances. How research contributes - provides a quantitative measure of the mass and energy flow from the solar atmosphere which form the high-speed solar winds and degrade satellite sensors, satellite and ground-based communications systems, and decrease accuracies of navigation systems.

Radio, EUV and X-ray wavelength solar observations will be used as input parameters for generating models of the coronal holes. The temperature and density profile from chromospheric levels to coronal levels will be derived to determine gradients which provide a measure of the energy transfer. The association of coronal holes with recurrent geomagnetic storms will be examined.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0010, SATELLITE ELECTRON BEAM SYSTEM

W. Huber, Tri Con Associates Inc., *Cambridge, Massachusetts* (DF243520; F19628-75-C-0114)

AF function - operational satellites. Deficiency - electrical charging of satellites may cause interruption or failure of electronic components of the satellite. How research contributes - development and flight of an electron beam system to induce controlled electrical charging. By simulating satellite charging the effects on a satellite of being charged while in orbit can be determined. The extent and nature of deleterious effects on electronic equipment can be studied.

A system will be built to enable the controlled ejection of high-energy electrons from a satellite. An electron beam successfully used on a number of rocket experiments will be the source of the electrons. The current, energy, and duty cycle of the ejected electron beam will be variable, and will be controlled by ground commands. The beam current will be variable from 100 nanoamperes to a milliampere, the range of energies will extend from .5 to 3 kev and the duty cycle extend from .01 percent to continuous. The specifications now call for the entire system, exclusive of batteries, to weight 5 pounds, to be contained in a volume of less than 200 cubic inches, to operate from batteries supplying from 20 to 40 volts, and to use less than 15 watts at maximum beam power.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0011, CRYOGENIC GAS REPLENISHMENT SYSTEM STUDY

A.S. Carten, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581760)

AF function - advanced balloon systems (surveillance, reconnaissance, communications, environmental research support). Deficiency or opportunity - present vehicles have limited altitude, duration and payload capabilities. Objective - to develop a system which will make long-duration (approx. 10 days) scientific balloon flights more efficient and cost-effective than at present. How research contributes - this work involves studies and investigations which are expected to lead to the design, fabrication and test of a prototype balloon inflation gas replenishment system. When the ultimate goals of this research are achieved it will be possible for the Air Force to conduct longer-term scientific or operational balloon flights than are practical at the present time. This will enhance the Air Force's mission capability in the areas of environmental and space research, air particle sampling, surveillance and point-to-point communications.

Preliminary studies have shown the feasibility of replacing the heavy ballast systems currently used on long-duration scientific balloon flights with lighter cryogenically-oriented gas replenishment systems. A mathematical model will be used to establish basic system parameters and additional studies will be made to determine the optimum method of heat exchange to warm the very cold gas to ambient air temperatures. The end product of this research will be a final report which will outline recommendations with respect to further development and proof-of-concept testing.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0012, LOW-ENERGY PLASMA OBSERVATIONS

R.C. Sagalyn, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF249210)

AF function - surveillance, communication, navigation, magnetospheric modelling and spacecraft changing. Deficiency -inadequate knowledge of the electrical properties of the magnetosphere and of the interaction of a satellite with the environmental plasma at synchronous altitudes. Objective - to design and fabricate instruments to measure the low-energy plasma (0 to 100 ev) environment of a synchronous orbit satellite to determine the role of low-energy particles in spacecraft charging. How research contributes - permits improved military space vehicle design for communication and surveillance systems, provides understanding of dynamical processes in the magnetosphere and contributes to the understanding and solution of spacecraft charging problems.

Low-energy plasma sensors will be flown on the spacecraft charging (SCATHA) P78-2 satellite. The sensors will measure and distinguish the major sources of low-energy particles contributing to the current flow to the spacecraft. In addition, the local spacecraft surface potential with respect to the plasma will be determined.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0013, ATOMIC OXYGEN ION LOSS RATES
W. Swider, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581060)

AF function - communications. Deficiency - inadequate kn wledge of f-region after a nuclear explosion will impact satellite communications. Objective - to improve knowledge of atomic oxygen ion loss rates. How research contributes - determination of accurate atomic oxygen ion loss rates, especially at high temperatures, will help improve communication codes at MF-HF-VHF-UHF after a nuclear detonation in the f-region.

Atmospheric data from the NASA Atmosphere Explorer satellites will be assessed with the aim of determining if there is information pertinent to f-region communications problems, particularly the atomic oxygen ion loss rate with molecular nitrogen at high temperature, which is a principal ionization loss mechanism for the f-region.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0014, ATMOSPHERIC COMPOSITION BY UV AND ELECTRON SPECTROSCOPY
R.A. VanTassel, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581290)

AF function - vehicle tracking during flight and re-entry, trajectory prediction, communication systems. Deficiency - present atmospheric models predict only slight variability of the density of the upper atmosphere below 200 km; however, empirical data show this conclusion to be incorrect and observations indicate density changes as great as 50 percent in both space and time at altitudes between 120 and 200 km. This altitude region, important for Air Force operations, will be studied on a worldwide basis by density experiments aboard the DMSP satellites. The present work will support these experiments. Objective -in situ measurements with rockets of atmospheric parameters to provide correlative data for comparison with photometric data from DMSP satellites. How research contributes - provides direct, low-altitude measurements of pertinent atmospheric properties as an aid in understanding the remote optical measurements made from DMSP satellites.

The goal of this effort is to measure at sounding rocket altitudes, various atmospheric parameters which may be used to verify the model development required for the interpretation of optical data acquired by sensors aboard DMSP satellites specifically for the purpose of remote density determination. Rocket measurements will be made of the photoelectron flux and differential energy distributions for energies between 0 and 100 electron volts, of the radiance of nitrogen airglow at 3371 Angstroms, and of the density and composition of the upper atmosphere as established by solar ultraviolet photon absorption rates. All measurements will be made from a single rocket payload in the altitude range between 120 and 200 km.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0015, SATELLITE/SPACEPLASMA INTERACTION STUDY
U. Samir, University of Michigan, Ann Arbor Campus, School of Engineering, Dept. of Electrical & Computer Engin, *Ann Arbor, Michigan* 48104 (DF581800; F19628-78-C-0046)

AF function - communication, ionosphere and magnetosphere modelling, spacecraft charging mechanisms. Objective - to determine the structure of a satellite sheath and perform a parametric study relating satellite velocity, altitude, ambient plasma density, temperature, and energy. How research contributes - defines and quantifies spacecraft sheath and charging properties enabling the effects on communications equipment and sensing systems to be evaluated.

A phenomological study of problems involved in spacecraft-spaceplasma interactions will be made by utilizing in-situ measurements made aboard Air Force satellites including the S3-2 and DMSP, block 5D.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0016, RESEARCH & DEVELOPMENT OF ANTENNAS FOR RESEARCH ROCKET AND SATELLITE APPLICATIONS
A. Waterman, New Mexico State University, Las Cruces Campus, Graduate School, *University Park, Las Cruces, New Mexico* 88003 (DF580200; F19628-78-C-0052)

AF function - command, control and communications. Deficiency -reduced effectiveness of systems for acquiring reliable telemetry data and trajectory inform0tion from R&D research probes, and for exercising command and control of these vehicles. Objective - to develop type acceptable antenna systems for AF R&D rocket probes and satellites. Improved reliability of systems for telemetry data transmission, trajectory determination, vehicle command and control, or other electromagnetic transmission and reception applications will be the final objective of this work. How research contributes - the development of highly reliable antennas will increase the effectiveness of instrumentation systems used to support AF R&D rocket and satellite programs.

Design and development will be based on the specific type of research vehicle to be instrumented and the various operational constraints. Antennas developed will be tested on an antenna range and on the research probe when possible.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0017, MARINE FOG INVESTIGATION
E. Mack, Calspan Corp., *1422 Genesses Ave., P.O. Box 235, Buffalo, New York* 14221 (DN890070; N00019-78-C-0179)

Acquire data which will provide an understanding of the micrometeorology and micro-physics of the marine boundary layer (MBL), needed to develop capabilities to predict visibility and electromagnetic propagation in the MBL.

An at-sea investigation will be coordinated with similar work on San Nicolas Island. Basic meteorological and aerosol properties will be measured in a wide area upwind of the island to establish the relationship between the two. The continental influence on aerosol populations will be studied.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

5.0018, THEORETICAL STUDIES OF IONOSPHERIC IRREGULARITIES
R.N. Sudan, Cornell University, Ithaca Campus, Lab. of Plasma Studies, *159 Sapsucker Woods Rd., Ithaca, New York* 14850 (DN780191; N00173-76-C-0359)

The DOD is becoming increasingly dependent upon satellite systems for communication, surveillance and navigational purposes. It has become increasingly evident over the past few years that turbulent structure developing in the ionosphere can adversely affect the transmission of satellite signals. This effect manifests itself in fluctuations in the phase and amplitude of the transmitted signal. The objective of the current program is to assist in identifying the cause and characterizing the properties of the relevant ionospheric plasma turbulence. This information is needed in order to provide prediction of satellite systems performance.

Modern theories of strong plasma turbulence are employed to characterize turbulence in the ionized component of the e and f regions of the ionosphere. The results of these calculations are compared with numerical studies performed at NRL and with radar data taken in the field.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

5.0019, SCATTERING BY NON-SPHERICAL PARTICULATES 15339-GS
D.W. Schuerman, State University of New York, Albany Campus, Graduate School, *1400 Washington Ave., Albany, New York* 12203 (DA0F9134; DAAG29-78-G-0024)

To investigate the limits0of validity of MIE theory in its application to non-spherical shaped particles. Relevance - scattering and absorption by randomly oriented non-spherical particles is relevant to investigations of smoke/aerosol obscuration, electro-

optical sensor performance under low-visibility conditions, remote sensing of atmospheric and terrain parameters, and propagation of the beam of a high-energy laser.

Measure extinction, albedo and scattering matrix of microwave radiation by targets of known shape, size, orientation and refractive properties in the specially designed microwave scattering laboratory. Use an electrodynamic similitude technique to scale from microwave to optical wave.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

5.0020, INFRARED PHOTOGRAPHY AND IRRIGATION IN THE BASIN OF MEXICO

W.T. Sanders, Pennsylvania State University, University Park Campus, School of Liberal Arts, Dept. of Anthropology, *110 Sparks Bldg., University Park, Pennsylvania* 16802 (BNS7823627)

The goal of this research is to develop and apply the technique of infrared aerial photography to detection of buried prehistoric irrigation systems. In the course of their surveys in the basin of Mexico Sanders and his associates have shed much new light on the settlement patterns, demography, and agricultural systems over a period of more than 2,000 years in the region of Mexico that was the homeland of the Aztecs at the time of the Spanish conquest. The recurring problem in these surveys has been the degree to which earlier settlements and systems of cultivation might be masked by later Aztec occupations and by the deposit of later sediments. One possible way of determining whether postulated extensive early irrigation systems are present is through the use of infrared aerial photography.

This project involves the completion of preliminary analyses of dry season and rainy season infrared aerial photographs of selected critical regions of the basin of Mexico. Early results have been quite promising and clearly merit further work. Completion of these analyses is indispensable to further systematic field work and excavations bearing on this problem.

SUPPORTED BY U.S. National Science Foundation, Div. of Behavioral & Neural Sciences

5.0021, LIDAR ATMOSPHERIC MEASUREMENT PROGRAM INDEX

K.J. Petri, U.S. Dept. of Defense, Navy, Naval Air Development Center, Sensors & Avionics Tech Directorate, *Warminster, Pennsylvania* 18974 (DN681244)

To investigate the feasibility of utilizing a lidar to remotely measure atmospheric properties which impact the performance of radio/optical frequency systems.

Lidar techniques will be tested and evaluated to determine the optimum method of remotely measuring the radio refractive index and electro-optical properties of the atmosphere. Measurement precision will be equal to or greater than that of existing radiosonde methods. Some work is also planned on contracts as reported in work unit RG702 B, B1 and RG704 B.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

5.0022, DYNAMICS OF GULF STREAM MEANDERS

D.R. Watts, University of Rhode Island, Graduate School of Oceanography, *Administration Bldg., Kingston, Rhode Island* 02881 (OCE7809655A01)

This project will study the dynamics of the Gulf Stream as the Stream leaves the continental margin at Cape Hatteras and flows into deep water. In this region meanders develop and grow in an envelope increasing downstream. At present, both theoretical and observational inconsistencies exist regarding the structure and development of Gulf Stream meanders. This project involves specific tests to resolve these conflicts including analysis of a large set of existing temperature data, utilization of data produced concurrently from existing program (e.g., satellite infrared imagery), and collection of new data from an array of deep current meters and inverted echo sounders, instruments which are particularly well-suited for monitoring the position of the Gulf Stream.

SUPPORTED BY U.S. National Science Foundation, Div. of Ocean Sciences

5.0023, ISIS II DATA ANALYSIS

D.J. Winningham, University of Texas, Health Science Center at Dallas, Graduate School, *Dallas, Texas* 75230 (DF278670; F19628-76-C-0005)

AF function - communications and detection. Deficiency - understanding ionospheric effects of particle precipitation in the arctic which degrade communications in that region. Objective - investigate the effects of auroral particle precipitation, measured by the ISIS-II satellite, on the ionization balance of the high-latitude ionosphere. How research contributes - this research effort is conducted to establish direct relationships between incident particle fluxes and specific features of the high-latitude ionosphere which result from these particles. A description of optical and plasma properties of the ionosphere from the measurement of particle fluxes, and the behavior of these properties during substorms, will lead to more effective and adequate interpretation of the satellite measurements and enhance remote sensing capabilities. Analysis of soft particle spectrometers data from the ISIS-II satellite also provide a framework for data collected by the AFGL Airborne Ionospheric Observatory.

Assemble and interpret ISIS-II soft particle spectrometer data to specify the structure of the ionosphere in the region of the auroral oval and f-layer trough. Reduce particle data taken during selected aircraft periods for correlation with DMSP auroral photos and aircraft data. Investigate ability to use 6300 Angstroms photometer data as an indicator of FOF2 in the polar trough region.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0024, CONTINUED GEOPHYSICAL ANALYSIS OF COHERENT SATELLITE SCINTILLATION DATA

E.J. Fremouw, Physical Dynamics Inc., *P.O. Box 21589, Seattle, Washington* 21589 (DF050590; F49620-78-C-0014)

AF function - satellite communications, deep space surveillance and global positioning from satellite signals are all affected by scintillation due to the ionosphere. Deficiency - DNA and AFGL are investigating signal statistics due to ionospheric irregularities. However to adequately understand, model and forecast the scintillations, their morphology and correlation with geophysical occurrences, as particle precipitation, needs to be accomplished. Objective - determine the morphology of subauroral scintillations and correlate their occurrence and relationships with the auroral electrojet, discrete auroral arcs, and particle precipitation. Contribution - an increase in the understanding of the physics of scintillations and possible insight into modelling is expected.

To analyze the VHF intensity and phase indexes from the DNA p76-5 satellite over Poker Flats, Alaska. Other geophysical information will be gathered and correlated with the scintillation data. Possible seasonal trends and the location and motion of the subauroral scintillation boundary will be investigated as will the relationships between scintillations and other observable phenomena.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

5.0025, UTILIZATION OF SATELLITE AND RADAR DATA IN SHORT-RANGE PRECIPITATION PREDICTION MODELS

D.D. Houghton, University of Wisconsin, Madison Campus, School of Letters & Science, Dept. of Meteorology, *500 Lincoln Dr., Madison, Wisconsin* 53706 (ATM7720231A01)

The objective of this research is the development and improvement of short-range (0-12 hr) prediction of precipitation. The primary emphasis will be on possible uses of satellite-derived wind and radar echo data as initialization parameters. A selection of mesoscale wind data derived from synchronous meteorological satellite (SMS) data will be analyzed with regard to quality and value. Objective analysis techniques will be studied and comparisons with data from synoptic scale and mesoscale models will

be made. In addition, the use of radar data to initialize prediction models for vertical motion will be considered and tested. A second goal will be the formulation of simple Lagrangian advection models designed to predict movement and changes in area of precipitation. These models assume the availability of data from comprehensive regional mesoscale models. Statistical and dynamical relationships between radar 'echo system' characteristics and model variables such as velocity, temperature and moisture, found by other investigators, would be used.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0026, COMMUNICATION FADING AT MAGNETIC EQUATOR

J. Wilson, Universidade Federal do Rio Grande, *AV. Hermes da Fonseca 780, Natal, Brazil* (DF249300; AFOSR-78-3613)

AF function - communications. Deficiency - communications outages, radar errors and false targets. Objective - to provide observational data of ionospheric deep fading parameters at magnetic equator. How research contributes - results used in statistical models of fading depth and occurrence.

The approach is to observe and record signals from suitable transmitting satellites at ultra-high and L-band frequencies. The data are reduced and furnished to AFGL in the form of punched cards. These data contribute to the understanding of the ionospheric irregularity structure found at the equator - at this time the longitudinal variation of equatorial scintillation is being investigated by means of these and similar data from other observations.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0027, SOLAR RADIO PATROL/MANILA/

V.L. Badillo, Manila Observatory, *Manila, Philippines* (DF582480; F19628-77-C-0200)

AF function - communications, surveillance and navigation. Deficiency - disruptions in communications systems due to solar-induced ionospheric disturbances. Lack of capability to predict interruptions to communications, false alarms in surveillance systems from natural causes, and navigation errors. Objective - to develop and interpret solar signatures of the onset of proton activity in the earth's atmosphere. How research contributes - makes reliable real-time information available to operational USAF groups. The primary purpose of this contract is to use data collected at Manila Observatory in solar-radio-optical, ionospheric and geomagnetic areas to interpret the time history of energetic particle emission.

Improve upon existing, and develop new, criteria for predicting the time history of energetic particle emission by addressing the magnetic field configuration and orientation of active regions as evidenced by optical and/or dekametric radio signatures.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, ASUPT NIGHT SCENE EVALUATION

D.F. Cataneo, U.S. Dept. of Defense, Air Force, Human Resources Lab., *Williams Air Force Base, Chandler, Arizona* 85224 (DF222070)

To evaluate the extent to which simulator training using an ASUPT reduced field of view night scene transfers to T-37 aircraft day time training.

A data base on trials to proficiency in T-37 aircraft training on selected maneuvers has been developed in work unit 1123-01-14 under conditions of no ASUPT training and using the full ASUPT day visual scene. The proposed project will extend these data by providing training on selected maneuvers using the ASUPT night scene with a reduced field of view. A sample of UPT trainees will be trained using the same syllabus developed for the earlier study but restricting the ASUPT visual to a night scene and to a 28 degrees x 44 degrees FOV. Trials to criteria on each maneuver will be recorded in the aircraft and these data compared to those compiled in the earlier study.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0002, AIR COMBAT MANEUVERING PERFORMANCE MEASUREMENT

D. Vreuls, Canyon Research Group Inc., *32107 Lindero Canyon Rd., Suite 123, Thousands Oaks, California* 91361 (DF223500; F33615-77-C-0079)

To develop a preliminary automated performance measurement system for one-vs.-one air combat maneuvering (ACM). The system developed should be implementable on the simulator for air-to-air combat (SAAC) and may have application to automated air combat ranges.

This will be a contract effort involving three phases. Phase I will be an analysis of one-vs.-one ACM and current performance measurement practices. The purpose of this analysis is to select parameters for data collection. Phase II will involve collection of time history data for selected parameters for a sample of one-vs.-one ACM engagements on the SAAC. Phase III will be an analysis of this time history information for the purpose of selecting a candidate measure set and developing an algorithmic structure or system to use these measures.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0003, HUMAN HEAD AND NECK RESPONSE TO MULTI-AXIS ACCELERATIONS DURING MILITARY PARACHUTING

D.W. Call, U.S. Dept. of Defense, Navy, National Parachute Test Range, *El Centro, California* 92243 (DN695430)

OBJECTIVES: (a) To acquire multi-axis acceleration data from the head and first thoracic vertebra (T-1) from subjects performing military parachute jumps; (b) to determine the physiologic effects of these inertial forces; (c) to correlate these data with other studies of human responses to impact acceleration; (d) to develop human factor guidelines for emergency egress and recovery design.

Naval test parachutist volunteers will be fitted with accelerometer mounts for the head and T-1. They will then wear these mounts with accelerometers while performing parachute jumps at the NATPARACHUTETESTRAN El Centro, using current fleet parachutes. Inertial and physiologic data will be transmitted to a ground receiving station during the entire egress and recovery event by a jumperborne 27-channel pcm telemetry system. Analog tapes of this data will be sent to NAVAEROMEDRSCHLAB Det. New Orleans for conversion to a digital format and computer-assisted automatic data reduction and processing. Further data analysis and interpretation will then be performed by both organizations. Results will be used to specify human tolerance limits to parachute opening shock.

SUPPORTED BY U.S. Dept. of Defense, Naval Medical Research & Development Command, National Naval Medical Center

6.0004, FORMAL VERSUS SITUATIONAL MODELS OF EXPERT DECISION-MAKING

S.E. Dreyfus, University of California, Berkeley Campus, School of Engineering, Dept. of Industrial Engin, *Berkeley, California* 94720 (DF052240; AFOSR-78-3594)

AF function - this research provides knowledge about the mechanisms of gaining experience, and is relevant to USAF training programs, especially flight training. Deficiency - the traditional apprenticeships of young flyers are being eroded as flying hour programs are cut. Ample flight time does not appear to be available to provide the types of experiences which 'matured' earlier generations of crew members. In the absence of these maturing experiences, the types of experiences which can effectively substitute for the traditional apprenticeship must be determined. Objective - the objective of this research is to further ex-

plore the differences between formal decision theory and situational sensitive expertise as it relates to the acquisition and performance of higher order skills of the type required in flying. How work contributes - this effort will support other basic and applied research directed at cognitive processing in aircrew members, especially in the domain of training emergency procedures.

The principal investigators will analyze a wide variety of scientific literature and report on the support found for the formal decision theorists and for the situational theorists. Several experienced pil ts will be interviewed, with emphasis on the role of experience in critical flight situations, to determine the suitability of both theories. Neurophysiological models will also be studied to see if they can account for any of the behavior of interest.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0005, EXERCISE ELECTROCARDIOGRAPHY IN AVIATORS - LONG TERM FOLLOW-UP OF THE THOUSAND AVIATORS

N.R. MacIntyre, U.S. Dept. of Defense, Navy, Naval Aerospace Medical Research Lab., Medical Sciences Dept., *Pensacola, Florida* 32508 (DN877427)

Ischemic heart disease statistics from civilian data show an annual incidence of coronary artery disease of about one percent in American men in their 40's. To the physician dealing with aviation medicine, a more important statistic is that sudden death is the first symptom in fifteen percent of this group. Therefore, it is essential to aviation safety to identify the pilot with coronary disease as early as possible. Exercise electrocardiography is a potentially useful tool. Several year follow-ups of initially asymptomatic, non-aviation populations have demonstrated the effectiveness of this procedure to identify subjects who develop clinical disease. Long-term follow-up statistics on large numbers of asymptomatic aviators who undergo routine exercise electrocardiography are lacking.

The U.S. Navy's Aerospace Medical Research Laboratory has just such a unique data bank. One thousand fifty-six healthy student aviators were first seen in 1940. The average age was 23. In 1958, at average age 41, 455 of 700 subjects seen in follow-up were given a double masters exercise test in addition to the usual studies. In 1963, at average age 46, all 705 subjects seen in follow-up underwent the Harvard step test in addition to the usual studies. In 1969, at average age 51, all 675 subjects seen in follow-up underwent Bruce protocol treadmill testing in addition to the usual studies. Obvious coronary artery disease in 1963, 1969, and 1977 (from proposed questionnaire) will be the end points of the analyses. The variables will include the results of the various exercise tests and the relationship of other risk factors such as cigarette habits, blo d pressure elevations, and hypercholesterolemia. The goal is to define the sensitivity, specificity, predictive value, and reliability of various exercise tests in 40-50 year old aviators over a seven to eighteen year follow-up. Analysis of data will also indicate the optimum age at which to begin stress testing and at which early changes are easiest to detect.

SUPPORTED BY U.S. Dept. of Defense, Naval Medical Research & Development Command, National Naval Medical Center

6.0006, DEVELOPMENT OF LOW-LEVEL DAYTIME CIG FOR FLIGHT TRAINING

J.L. Booker, U.S. Dept. of Defense, Navy, Naval Training Equipment Center, *Orlando, Florida* 32813 (DN894006)

Continuing review of hardware technology for CIG, development of new architectural approaches, development of new methods of data base programming, and developing applications of CIG technology in training simulations in new areas such as submarine periscope navigation and helicopter nap-of-the-earth flight modes.

The following major tasks will be implemented: (1) continuing review of CIG hardware technology; (2) development of new CIG architectural approaches; (3) develop trial environments for nap-of-the-earth flight missions and submarine periscope navigation simulators.

SUPPORTED BY U.S. Dept. of Defense, Naval Training Equipment Center, Experimental Computer Simulation Lab.

6.0007, TOXICITY OF OPERATIONAL AND DEVELOPMENT DINITRATE MONOPROPELLANTS IN ANIMAL MODELS OF METABOLIC, VASCULAR AND NERVOUS SYSTEM EFFECTS

T.A. Hill, U.S. Dept. of Defense, Navy, Naval Medical Research Inst., Environmental Biosciences Dept., *Bethesda, Maryland* 20014 (DN777314)

1,2-propylene glycol dinitrate (1,2-PGDN), the major constitutent of OTTO fuel II torpedo monopropellant, causes headache, hypotension and loss of balance in humans exposed to very low vapor concentrations. It is the objective of this work unit to assess the potential for risk to personnel by inhalation/absorption of propellant dinitrates with specific focus on numbers and position of nitro groups in the propellant molecule and their impact on hazard to health.

Experiments in acute oral and intraperitoneal toxicity, hem globin oxidation, vascular sm oth muscle relaxation, nerve transmission blockage, and metabolic detoxification mechanisms will be conducted with dinitrated propellant molecules having adjacent and rem tely placed nitrate moieties. The results of these studies will indicate the potential for reduced toxicity of propellants of differing chemical structure. The initial effort will be largely descriptive and comparative, providing health hazard information for development or validation of personnel exposure limits on the basis of specific toxic effects on target organ system of animal models. Further information regarding the potential for chronic human effects will be obtained in studies of the extent and mechanism of the development of tolerance to the effects of different nitrate propellant types.

SUPPORTED BY U.S. Dept. of Defense, Naval Medical Research & Development Command, National Naval Medical Center

6.0008, VISUAL DISPLAY INTEGRATION FOR ADVANCED FIGHTER AIRCRAFT

G. Mills, McDonnell Douglas Astronautics Co., *E. 411 St., St. Louis, Missouri* 63166 (DF323660; F33615-77-C-0536)

To provide a systematic definition and assessment of optical visual display design approaches for future tactical fighter aircraft employing advanced technology. During FY 77 this contract will begin (1) a planning and technical framework for a phased, multi-year development and evaluation of cockpit design alternatives, and (2) a series of engineering trade-off comparisons am ng alternative approaches for visual display integration. This effort is needed because cost reductions dictate smaller size vehicles which results in reduced panel space for cockpit control display, as typified by the F-16; at the same time technology provides an overwhelming amount of flight data and new flight modes previously unavailable with inadequate means of integrating the new techn l gies and determining impact on the crew. The proposed work will aid in closing the gap in display integration technology in a near-term applied context emphasizing advanced avi nic and flight vehicle state-of-the-art.

This is the second of three contract efforts (triple award) aimed at developing better methods and criteria for interfacing tactical aircrews within advanced technology fighter aircraft (i.e., operational capability post 1985). Visual display design alternatives will be derived based upon mission requirements analyses, crew size/function options, and potential (aircraft, avionic, and display system) technology combinations. Engineering trade-off comparisons among the postulated alternatives will determine the incremental impact of specific applications of advanced display technology upon aircrew needs, capabilities and cockpit configurations. Figures of merit used in the trade-off analysis will include performance, safety, survivability and cost. Promising alternative designs may be selected for detailed development and evaluation under a follow-on contract.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0009, ENGINEERING ANTHROPOLOGY FOR DESIGN OF AF SYSTEMS

M. Alexander, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF319190)

This work unit provides consultancy and guidance for the application of engineering anthropometric data in support of engineers and designers, and aids in the evaluation of the application of these data in end items and systems. Principal areas of work are related to the sizing and design of personal protective equipment for hazardous environments and the integration of the man (fully encumbered pilot) with his work station (cockpit).

Detailed anthropometric data form the basis for guidance in the design, sizing and procurement of clothing and personal protective equipment and for the design and layout of work spaces. These data to be effective must reflect the practical requirements of a design problem and/or end item. Each design task becomes a matter of reanalyzing the existing data, or developing new data as needed, to meet the specific requirements of a partic ·lar anthropometric design problem. This effort was formerly included under work unit 71840803, anthropometric design criteria for AF systems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0010, MODEL OF BIOMECHANICAL RESPONSE IN MOIFE

D.R. Burchfield, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321250)

This work unit is part of an effort whose end product will be a predictive model of pilot tracking performance in low-level, high-speed flight. Fundamental to achieving that goal is the construction of a biomechanical model of the feedthrough of vibration through the musculoskeletal system and into the aircraft system. That is the objective of this work unit. This modelling effort will also contribute to a related effort whose product will be a predictive model of visual performance in low-level, high-speed flight.

For the most part, the data needed for this modelling effort will be collected from vibration experiments conducted under work units 72310180 and 72310182. Fairly adequate models already exist for the feedthrough from the shoulder to the control stick. The major emphasis of this effort will be to model the transmission of vibration from the buttocks through the vertebral column to the shoulder and to the head.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0011, MEASUREMENT, PREDICTION AND EVALUATION OF BIOENVIRONMENTAL NOISE IN SUPPORT OF AF SYSTEMS/OPERATIONS

N.A. Farinacci, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321430)

The goal is to provide technical support required by system program offices, MAJCOMS, airbases, AF labs, and others on specific environmental noise problems that would otherwise be outside the scope of AMRL's R&D program. This support provides 200 to 300 customers per year with the data, procedures, software, and guidance needed to define and evaluate crew and community noise problems caused by specific existing or planned Air Force operations. The range of problems include: AICUZ, noise exposure/levels for environmental impact statements, facility siting, real estate decisions, monitoring of airbase noise, sound propagation, runup noise suppressors, identifying hazardous noise areas/operations, and computational/analytical methods.

The approach is to measure, predict and evaluate the customer's specific noise problem by applying the instrumentation, measurement methods, noisebank, omega software, predictive methods and other tools developed by AMRL. Travel/per diem costs will generally be paid by the customer. Results will usually be documented in the form of letter reports or memoranda.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0012, OPERATOR HEAD/EYE CONTROL CHARACTERISTICS

J.P. Hornseth, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321040)

The main thrust of this work unit will be to determine the conditions under which it is desirable to use the head or eye for manned and unmanned aircraft piloting, weapon delivery, and sensor control. The research effort will concentrate on determining the natural characteristics of hand, head, and eye tracking, including the effects of environmental stressors on these characteristics. An integral component of the research will be the effects on control performance of image format and location in the visual field of displayed feedback and secondary task information. The results will provide data required for the selection and specification of control-display systems proposed for operational applications. The research will also identify promising new techniques of harnessing the operator in control task situations and suggest further development or prototype application and evaluation.

Experimentation will be conducted in a fixed-base laboratory and in simulated flight environments incorporating vibration and gz stressors. When practical, data from complementary in-flight tests will be used to validate the ground-based results. Operator control performance with a hand controller, the helmet-mounted sight, and the oculometer will be investigated to establish a data base of operator pointing accuracies and frequency response which will document the performance tradeoffs for hand, head, and eye controllers. Concurrent experimentation on a vibration simulator will begin to quantify the effects of a buffetting environment on head control and seek to develop software techniques to compensate for errors induced by the head rotational system's vibration transmissivity. Experimentation to be conducted on the AMRL centrifuge will compare hand, head, and eye control performance under gz acceleration to determine the mode of response that is best for an operator to use in aiming the fire control system in a high-performance aircraft. Additional laboratory experimentation will explore natural head-eye coordination. The results will influence the design of the helmet-mounted sight reticle and the development of a helmet-mounted oculometer. This effort was previously reported under work unit 7184-04-43, control concept development.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0013, BIOLOGICAL MATERIAL PROPERTIES AND BIODYNAMIC MECHANISMS

I. Kaleps, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF320830)

It is of utmost importance in the development of aerospace manned systems to be able to predict the injury potential to the human occupant of such systems during the design phase. Various approximate analytic and computer modeling techniques have been developed for this purpose; however, the proper implementation of these methods requires a detailed knowledge of the structure, dynamic response and injury mechanisms of the human body. It is the purpose of this effort to assimilate such data and reduce it to the proper form for inclusion in various highly sophisticated biodynamic body models. This will allow predictions of human body response to various and complex mechanical force applications and respective assessments of injury potential.

Analytic and computer model descriptions of the function, structure and dynamic behavior of human biodynamic subsystems will be developed. These studies will be paralleled by investigations of spinal material properties and structure as well as ligament, bone and other tissue properties, infrasound interaction with respiratory function and internal forces and ranges of motions of joints. Efforts will be made to integrate the subsystem characteristics into more encompassing models describing segmental or total body response.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0014, EFFECTS OF HIGH ACCELERATION INDUCED BRAIN BLOOD FLOW DISTRIBUTION ON HUMAN OPERATOR PERFORMANCE

J. Yoder, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF322450)

To measure the effect of gz acceleration on cerebral blood flow rate and the impact of this stress-response interaction on human operator performance. To evaluate the relationships of cerebral blood flow values determined by radioactive microsphere distribution to cardiac output. To determine the efficacy of cerebral blood flow rate manipulation in terms of performance enhancement. This technology will define those physiological criteria which contribute to the optimization of human performance.

The effect of acceleration on intracerebral blood flow distribution will be determined by the injected radioactive microsphere technique. The rationale of indirect assessment of cerebral perfusion on the basis of cardiac output determination will be tested. Cerebral blood flow distribution as determined by radioactive microsphere dispersion will be ccorrelated with simultaneous dye dilution cardiac output determinations in animals. A broad spectrum of cardiac output values will be induced by provocative measures such as cardiac pacing, and acceleration. Modification of the behavioral effects of acceleration-associated cerebral blood flow rate by a variety of flow augmentation techniques will be delineated in instrumented, performance-trained animals.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0015, DETERMINATION OF G-CUE ENVIRONMENTS

M.D. Fiore, U.S. Dept. of Defense, Air Force, Human Resources Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF228230)

To determine the pilots' g-cue environment of various respresentative aircraft under typical maneuvers. The results will be applicable to the development of future motion and force systems including the advanced low-cost g-cuing system. The end product of this work is a data base of representative aircraft g-cue environment profiles. No technical report will be published.

The approach is to collect data through use of the computer flight models for the various aircraft under typica maneuvers. Flight models of representative aircraft will be used such as F-15/16 (fighters), c-130 (cargo), and AMST (transport). The output accelerations will then be transferred from the aircraft center of gravity (c.g. point) to the pilot seat using the aircraft angular velocity, acceleration, and position vector to the seat location. A compilation and evaluation of the data will be performed to determine the g-cuing simulation needs for such aircraft types under typical maneuvers and to gain a better understanding of their motion and force simulation requirements. The lamars facility at the AFFDL will be used to obtain much of data desired on the effort. This information will be obtained by 'piggy-backing' the study with planned aircraft handling qualities studies. The lamars cockpit will not be used in this study. Only the lamars computational system will be required.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0016, M&O IN SPT OF RSCH ON VISUAL PERFORMANCE IN MULTIAXIS OSCILLATING INERTIAL FORCE ENVIRONMENTS (MOIFE)

G.T. Collins, University of Dayton, Research Inst., *300 College Park Ave., Dayton, Ohio* 45469 (DF317930; F33615-76-C-0401)

Effects of chronic and acute exposure of humans to vibration stress are not sufficiently well understood to permit optimal weapon system design. The primary goal of this effort is continued safe operation of the branch's motion simulators in support of in-house research. Emphasis on in-house control of experiments with human subjects dictates that protocols and interpretation of reduced data be controlled by Air Force personnel. Additional research is therefore aimed at obtaining support in carrying out approved protocol, obtaining data, and improvement or modification of simulators to give special environmental simulation.

The contractor will (a) establish and/or maintain safe operational procedures for all branch motion simulators and power supplies in operational status, (b) provide continuing operational and engineering support for said simulators and power supplies, (c) provide research into special instrumentation required for experiments carried out on said simulators, (d) provide data collection, reduction and analysis support for experiments carried out on said simulators, (e) provide research required to modify said simulators, their power supplies or their control systems when special environmental simulation is foreseen, (f) provide orientation in operation and maintenance of branch motion simulators to otherwise qualified newly assigned in-house personnel.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0017, MIXED-MEDIA FILTER FOR AIRCREW BREATHING SYSTEMS

G.V. Columbo, Umpqua Research Co., *Myrtle Creek, Oregon* 97457 (DF320320; F33615-76-C-0603)

The purpose of this work unit is to provide a comprehensive and experimental study of mixed silica gel and charcoal as a dryer/filter system for oxygen purification. These dryer/filters are to be employed on advanced military aircraft using chemically based oxygen generating systems. This effort supports ASD/AEL.

The study shall include (1) an investigation of simple mixtures of silica and charcoal, and (2) the product of the precipitation of charcoal dispersed in a solution of sodium silicate. Sorbent concentrations shall be varied such that water vapor absorption, contaminant (5 separate organic compounds) absorption, flammability, and regeneration criteria can be established in an atmosphere of 100 percent oxygen.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0018, OPERATIONAL LIMITS TO REPEATED EXPOSURE OF HIGH PLUS GZ ACM

J.W. Burns, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF324130)

To determine if cardiovascular, specifically myocardial, injury results from exposure of miniature swine to operational levels of sustained and repeated plus gz similar to Air Force pilot exposures in high-performance fighter aircraft. If myocardial injury is observed, an effort will be made to define the injury and determine whether cardiovascular physiologic function is compromised.

Miniature swine will be chronically instrumented for the measurement of left ventricular function before, during, and after exposure to operational simulated air combat maneuver (SACM) acceleration profiles. The animals will be monitored systematically over a period of up to six months while being exposed three times per week to the operational SACM plus gz. A group of similarly instrumented control animals will be maintained and monitored for the same length of time to determine any influence the instrumentation may have on function.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0019, JOINT USAF-USN DEVELOPMENT OF A 2-MAN OXYGEN GENERATOR FOR TACTICAL AIRCRAFT

K.G. Ikels, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF322940)

This work unit will develop breadboard systems for generating aviators breathing oxygen in flight, with minimal or no requirement for ground support. With current oxygen systems, which include liquid or gaseous oxygen stores, tactical aircraft are constrained in mission duration by storage capacity, in turnaround time by the need for ground servicing, and in basing options by the availability of oxygen supply. The development of onboard in-flight oxygen generation systems will eliminate these constraints, as well as improve systems safety. This exploratory development effort is closely coordinated with the Life Support SPO (ASD/AEL) and the USN (NADC).

Alternative on-board oxygen generating (OBOG) concepts will be developed to the breadboard stage, and evaluated in-house for performance and human compatibility. Parametric investigation will be conducted to optimize oxygen production and minimize aircraft weight, power and cooling penalties. Technology handoff will be made to the Life Support SPO for engineering development, and operational test and evaluation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0020, ENHANCEMENT OF AIRCREW PERFORMANCE BY OPTICAL EQUIPMENT

B. Kislin, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF321970)

Optical devices have the potential to enhance flight crew performance and/or facilitate inflight procedures. In order to insure that AF aircrew are provided with optical aids which can optimize their performance, development and testing of visual devices will be on a continuous basis.

The USAFSAM will respond to operational problems identified from the field for development assistance and/or in planned research efforts where a long-standing need may exist. Filter enhancement for target detection, multifocals designed specifically for cockpit use, and new spectacle frame developments in new plastic materials will be studied. Efforts under this work unit were previously documented as work unit 7755-09-03.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0021, CREW UTILIZATION RULES FOR MAXIMUM TACTICAL OPERATIONS

D.L. Makalous, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF322180)

The objectives are (a) to evaluate fatigue in tactical aircrews and maintenance personnel during schedules of maximum operations (surges and deployments), (b) to determine the time course of recovery following maximum operations, and (c) to adapt and improve the SAM stress battery so as to be sensitive to relatively short duration flights of tactical sorties where 3-4 missions may be flown per day.

An initial field study of a two-week sortie surge was conducted on an A-7 squadron in Jul-Aug 76. Documentation was under 7930-09-11 and 7930-09-03, and will continue under this effort. Measurement of cumulative fatigue and physiological cost was performed on TAC personnel conducting a two-week sortie surge following simulated deployment. Data analysis is just beginning. Emphasis will be given to the relationship between number of sorties per day, number of consecutive days, and requirements for recovery from fatigue. At this time, there is relatively little data on maintenance personnel that will be of value in many AF operations. Portions of this effort were previously documented under 7930-09-11 and 7930-10-03.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0022, STANDARDS FOR PERIODS OF EXCUSAL BETWEEN CHAMBER TRAINING & AIRCRAFT FLIGHTS

R.M. Olson, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF323230)

Air Force missions regularly expose aircrew members to cabin altitudes as high as 25,000 feet for periods up to an hour. Consequently, decompression sickness is a potential hazard. Regulations require that aircrews periodically take refresher courses including altitude chamber training. The Air Force Surgeon General has raised the question as to the optimal grounding time between altitude chamber training and routine aircraft flights. On the one hand, excessive grounding times or periods of excusal are wasteful of manpower; on the other hand, too brief periods of excusal will increase the potential for decompression sickness. Recent advances in Doppler technology provide a new approach to determine incipient bends. The object of this effort is to use this new technology to determine the optimal periods of excusal between training and prolonged altitude exposures.

The effect of routine altitude-chamber training flights on the probability of developing bends in subsequent prolonged altitude exposures will be determined by use of the Doppler ultrasonic bubble detector. This newly developed device estimates the level of circulating bubbles which in turn estimates the probability that bends will occur. The shortest grounding time between training and mission flights which does not increase the likelihood of bends will be determined.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0023, CLINICAL LABORATORY TECHNIQUES

D.F. Wease, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF321750)

To develop new techniques in the measurement of clinical parameters in laboratory medicine to improve the discrimination between health and disease. These improvements will enhance the accuracy of selection criteria of USAF aircrew and enable flight medical personnel to intervene at an early stage in an illness in USAF personnel.

Modify existing techniques and equipment and/or develop new techniques and equipment with emphasis on specificity, accuracy, precision and cost reduction.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0024, ADVANCED HELMET-MOUNTED SIGHT (AHMS)

A.R. Deruyck, Polhemus Navigation Sciences Inc., *Burlington, Vermont* (DF322380; F33615-77-C-0513)

To design, develop and fabricate a laboratory grade advanced helmet-mounted sight (AHMS) system that will provide six degrees of freedom position information of a subject's helmet in suitable output format necessary for integrating it into the visually-coupled airborne system's simulator (VCASS) program. Two additional objectives of this program are to develop a suitable integration of the AHMS system with state-of-the-art wide field-of-view (FOV) side-mounted helmet mounted display (HMD) optics and cathode ray tubes (CRT) and to develop a long-range multiplexed AHMS system which will allow resolution of helmet position and attitudes at distances far greater than those required in high-performance aircraft.

This effort will be divided into four phases: (1) conceptual design phase, (2) detailed design and fabrication phase, (3) test phase, and (4) engineering support phase. Each of these phases shall concentrate on four major areas of development: (1) primary AHMS hardware and programming, (2) hardware and programming for the long-distance multiplexed AHMS (LAHMS), (3) hardware and programming necessary to provide integrated HMD/AHMS (HAHMS), and (4) system electronics processing and control circuitry. Each phase has predetermined goals which must be met in each of these four areas before work can proceed into the next phase. Finally, sufficiently severe testing is performed in characteristic environments to assure that VCASS requirements are met and that system viability for a follow-on airborne qualified system is achieved.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, PROBLEMS IN STABILITY ANALYSIS OF FINITE-DIFFERENCE SCHEMES FOR HYPERBOLIC SYSTEMS

M. Goldberg, University of California, Los Angeles Campus, School of Letters & Science, Dept. of Mathematics, *405 Hilgard Ave., Los Angeles, California* 90024 (DF044280; AFOSR-76-3046)

AF function - the study of nuclear weapons effects on aerospace vehicles and ground structures. Deficiency - stable high-order accurate numerical schemes are needed for computing flow shocks, contact discontinuities and gradients. Objective - this research intends to study high-order accurate finite-difference schemes which are usable in the area of the shock and the region behind the shock. How work contributes - could eliminate the need of mixed-order accurate schemes when computing shocks.

The stability of finite-difference schemes for hyperbolic partial differential equations will be investigated. The aim is to achieve better understanding of stable computational techniques for initial value; this includes smooth problems in the quarter space, as well as Cauchy problems whose solutions contain shock-waves or other types of discontinuities. The investigations will include the particular norm properties of the generalized numerical radii, which are helpful in investigating linear stability of difference approximations in several space dimensions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0002, NUMERICAL METHODS FOR NONLINEAR LEAST SQUARES PROBLEMS

W.B. Gragg, University of California, San Diego Campus, Graduate School, Dept. of Mathematics, *P.O. Box 109, La Jolla, California* 92037 (DF049230; F49620-77-C-0108)

AF function - the design of hardened electronic devices. Opportunity - electronic devices in aerospace vehicles may be exposed to external threats like electromagnetic pulses (EMP) generated by nuclear devices. It is very important to determine the electric fields generated by EMP in the surface as well as in the internal parts of the vehicle. This research presents a distinct approach for computing the internal currents in bundles of wires. Objective - to continue research efforts in the area of nonlinear least squares problems. In particular, this work will seek extensions of cyclic rank one update methods developed by the proposer. How work contributes - techniques may be developed which could enhance the design of hardened electronic devices for aerospace vehicles.

This research will investigate extension of the basic theory for nonlinear least squares for the purpose of making the following extensions - (1) an asymptotically equivalent version of the cyclic rank one update previously developed, (2) extension to SOR and SSOR updating methods, (3) extension to methods based on Chebyshev semi-iteration, and (4) adaptation of the conjugate gradient method, as a generalization of (3).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0003, TECHNICAL REQUIREMENTS FOR DSF SOFTWARE AND ANALYSIS SUPPORT

Unknown, Computer Sciences Corp., *8728 Colesville Rd., Silver Spring, Maryland* 20910 (FA77NA-4011; FA160243 (TRAIS NO.))

Obtain contractor-furnished technical support necessary to accomplish a variety of computer software and analysis services in support of NAFEC's Digital Simulation Facility (DSF). This contract will be divided into several task orders as follows: I. Development of DSF software to support the satellite program. II. Development of a data bank for analysis of test results. III. DSF computer program detail redesign. IV. Design and implementation of DSF computer programs to support new requirements. V. Technical support for the design of experiments and data analysis. VI. Programming support for cockpit simulation facility (CSF). VII. VFR model development and implementation. VIII. Performance measurement analysis. IX. Test inputs preparation program (TIPP) enhancement.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

7.0004, SOFTWARE DEVELOPMENT TO DISPLAY SEASAT-A AND TIROS-N DATA

M. Daniels, Systems & Applied Sciences Corp., *6811 Kenilworth Ave., Riverdale, Maryland* 20840 (7-632; K03-8-A02-4290)

OBJECTIVE: Develop computer software to display on a mercator map projection the earth located, calibrated data and retrieved geophysical parameters from Seasat-A SMMR and SASS Instruments, and TIROS-N MSU Instrument.

APPROACH: Data from the SMMR, SASS, and MSU instruments are to be processed from Seasat-A and TIROS-N tapes and displayed at fixed grid points on map projections. Algorithms for deriving geophysical parameters will be incorporated into the program component to produce displays of geophysical parameters on different map projections.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Environmental Satellite Service

7.0005, PROGRAMMING SERVICES IN SUPPORT OF THE FLIGHT SERVICE STATION SPECIALIZED AUTOMATION

Unknown, Data Transformation Corp., *10 Columbus Cir., Suite 1675, New York, New York* 10019 (FA78NA-5071; FA161507 (TRAIS NO.))

The purpose of this study is to provide programming services at NAFEC to the Flight Service Station Branch in the development of hardware/software specifications for FSSSA. This involves the provision of computer programming support for the development of the hardware/software capability for testing to determine display and operational parameters pertinent to the NSSA Program and prepare, check out, demonstrate and document program and program elements written for the Interdata 8/32, 7/32 computers, and/or the Genise GCT-3000 programmable Graphic Processor. The ultimate result of this effort is to provide for modifications of existing computer programs and development of new programs and technical data package.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

7.0006, STATISTICAL COMMUNICATION THEORY AND ROBUST ESTIMATION

S. Cambanis, University of North Carolina, Chapel Hill Campus, School of Arts & Sciences, Dept. of Statistics, *Chapel Hill, North Carolina* 27514 (DF040530; AFOSR-75-2796)

AF function - communication systems and signal processing. Ranking and selection procedures for industrial and military components. Deficiency - improvements are needed in the techniques of identification and representation of signals observed through nonlinear devices. The need is obvious for an easy-to-apply ranking and selection sequential rules for selecting the best systems as compared to a standard. Objective - improve the understanding of the operations and make possible the development of communications systems and further develop signal processing methodology. Develop methods to evaluate the precision and consistency of estimates that arise in such fields as reliability evaluation and quality control. How work contributes - the research suggested will allow for better design of communication systems and signal processing techniques. It also improves the precision of estimates for the parameters of interest and make available sequential ranking and selection rules that can be implemented to eliminate inferior populations early in the experiment.

The proposed research includes the study of stochastic differential equations with general Gaussian driving process, and stochastic filtering with general Gaussian noise. The representation and identification of nonlinear systems will be studied. The inverse problems for nonlinear systems will also be considered. Introduction will be attempted of some new classes of stochastic processes and the study of the nonlinear estimation and the detection problems involving them. Also work will continue in the areas of robustness, sequential ranking and selection, and nonparametric regression analysis.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0007, SOME TECHNIQUES OF DATA ANALYSIS IN FLIGHT CONTROL AND RELATED PROBLEMS
P.R. Krishnaiah, University of Pittsburgh, School of Liberal Arts, Dept. of Mathematics & Statistics, *16 Cathedral of Learning, Pittsburgh, Pennsylvania* 15213 (DF139930; AFOSR-77-3239)

Part of AFFDL's responsibility is the development of advanced flight control systems and crew stations. In order to compare candidate flight control systems and crew station components, simulations and flight tests are conducted in which pilot performance is measured. However, there is no single measure of pilot performance, thus requiring the collection of many kinds of performance data and their analysis by means of multivariate statistical techniques. The objective of this work effort is to evaluate available multivariate statistical techniques for simultaneous comparison of mean vectors and the development of computer programs to implement these techniques.

Seven currently available techniques will be evaluated by the contractor as to their robustness to violations of the assumptions of homogeneity of the population covariance matrix and the normality of the multivariate distribution. The most robust technique will be implemented by means of computer programs which will be available for use by AFFDL personnel.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

7.0008, AIRCRAFT/STORE DATA MANAGEMENT
H. Kaupp, Arnold Research Org. Inc., *Arnold Air Force Base, Tullahoma, Tennessee* 37389 (DF421052; F40600-77-C-0003)

To implement a computerized data management system for storage and retrieval of aircraft/store aerodynamic data.

Aircraft/store aerodynamic data and related information will be collected and stored to initiate system operation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Arnold Engineering Development Center

7.0009, COMPUTATIONAL AND THEORETICAL COMPARISON OF FINITE ELEMENT METHODS FOR SECOND ORDER HYPERBOLIC EQUATIONS 15469-M
M.P. Gunzburger, University of Tennessee, Knoxville Campus, School of Liberal Arts, Dept. of Mathematics, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (DA0F9234; DAAG29-78-C-0024)

To study some open mathematical and computational problems concerning second-order hyperbolic equations. Relevance - hyperbolic systems arise most often in transonic and supersonic flow and hence the proposal is relevant to aerodynamic problems at MIRADCOM and AVRADCOM. Such systems also have potential relevance to shock problems in structures and the research is therefore of interest to ARRADCOM.

Second and fourth order accurate finite difference and finite element methods will be compared on hyperbolic systems with various boundary conditions in various domains. Both theoretical and computational aspects will be studied.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

7.0010, NEW TECHNIQUES IN NUMERICAL ANALYSIS AND THEIR APPLICATION TO AEROSPACE SYSTEMS
A. Miele, Rice University, School of Engineering, Dept. of Mechanical Engineering & Materials Science, *6100 Main St., Houston, Texas* 77001 (DF033520; AFOSR-76-3075)

AF function - the design of effective lightweight aerospace vehicles. Opportunity - optimization algorithms of the gradient restoration type may be useful in the design of structures with minimum weight for a given stiffness and natural frequency. Objective - this research will investigate numerical techniques in system theory and aerospace engineering of particular interest to the Air Force. How work contributes - techniques to be developed under this effort when properly implemented may be used as design tools by aerospace engineers.

The research will involve the following problem areas - (1) transformation techniques for making the SGRA and the MQA algorithms applicable to a wide variety of problems of optimal control, (2) sequential gradient-restoration algorithm with discontinuous control, (3) sequential gradient-restoration algorithm with discontinuous state, (4) interaction of linear programming and optimal control, (5) method of multipliers, (6) approximation of a continuous control with a succession of piecewise constant control, and (7) structural optimization involving statical as well as dynamical problems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0011, NUMERICAL SIMULATION OF SPACECRAFT CHARGING PHENOMENA
J.G. Laframboise, York University, *Toronto, Ontario, Canada* (DF043460; AFOSR-76-2962)

AF function - electrical and surveillance systems on Air Force satellites have been disrupted by transient signals associated with differential charging of the spacecraft. Deficiency - theoretical studies of spacecraft charging are needed to aid in the design of experiments and the interpretation of the data. Objective - a numerical model is to be developed to simulate the plasma sheath surrounding a spacecraft. Contribution - this study will provide a theoretical model to understand the data obtained from the SCATHA (spacecraft charging at high altitude) satellite and other spacecraft charging phenomena.

The computer program describing the spacecraft and plasma sheath interaction will be tested and validated by making theoretical predictions of the charging behavior of sample spacecraft configurations. The validated program will be used to investigate -effects of surface materials and surface conductivity and their variation with position, spacecraft-rotation relative to sunward direction, time-dependent ambient plasma distribution, spacecraft geometry and sheath potential, different floating potentials on isolated surfaces. The program will be modified to permit calculations involving non-circular two-dimensional geometries which could be used to model antenna shading of a spacecraft body or shaded cavities where unusually severe arcing has occurred.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, INFRARED PROPERTIES OF HIGHLY TRANSPARENT SOLIDS
M. Braunstein, Hughes Aircraft Co., Research Laboratories, *3011 S. Malibu Canyon Rd., Malibu, California* 90265 (DF052990; F49620-78-C-0094)

AF function - high-energy laser technology is finding wide application in future Air Force systems. Opportunity - both in the generation of intense infrared coherent radiation and in hardening of certain critical components to this radiation, understanding the basic interactions of photons with transparent solids is of extreme importance for the advancement of high-energy lasers. Objective - the primary purpose of this research is to investigate the source and nature of residual absorption in highly transparent solids in the infrared spectral region. The extrinsic mechanisms of infrared absorption are studied experimentally in thin-film coating materials and ultra-pure bulk materials grown by the reactive atmosphere process. Optical properties are correlated with chemical and physical properties and structure in these IR transparent materials. How work contributes - the knowledge and understanding gained could be of practical importance to the operation and performance of high-power lasers and to the hardening of window materials.

Infrared laser calorimetry will be utilized to measure absorption coefficients. Measurements on long specimen bars should yield information on extrinsic absorption mechanisms in bulk, surface and films. Modulated light infrared ellipsometry will be used for studying the optical and mechanical properties of thin

films and surfaces and to measure refractive indices thickness and optical anisotropy resulting from strain-induced thermal expansion and lattice mismatch. Structural and mechanical properties of films and surfaces produced by ultra-high vacuum techniques will be examined by electron microprobe and scanning electron microscopy. Coating and bulk materials will be grown by the reactive atmosphere process.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0002, KINETICS AND STRUCTURE OF EXCITED STATES

T.F. Gallagher, S R I International, *300 Ravenswood Ave., Menlo Park, California* 94025 (DF039030; F44620-74-C-0069)

AF function - research objective 6.3, electromagnetic weaponry. Opportunity - the achievement of efficient, high-power visible lasers will depend critically on knowledge of those processes that influence the excited states of the lasing medium. Objective - to make measurements on excited electronic states of atoms and molecules. Contribution - information on radiative decay, collision quenching, energy transfer, etc., will be useful in development of visible lasers.

A study is being made of electronic energy transfer between highly excited states of an alkali atom and other atoms, such as Hg or another alkali. The transfer process is being examined as the initial excited states are varied through the resonance region. Measurements are being made of energy transfer rates between excited states of alkali atoms and vibrational states of simple diatomic molecules, such as NO, CO, N2, and O2.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0003, TURBULENT PLASMA HEATING

J.S. Degroot, University of California, Davis Campus, School of Engineering, Dept. of Applied Science, *Davis, California* 95616 (DF044930; F49620-76-C-0014)

AF function - operation of high-altitude vehicles in a post nuclear explosion environment, development of electromagnetic weapons, space and ionospheric communications as well as countermeasures demand the fundamental understanding of turbulent plasma heating and X-ray production. Deficiency - the aforementioned information required for the design of advanced equipment is not available today. Its acquisition may be realized by a well-planned theoretical and experimental research program. Objective - this project will investigate both theoretically and experimentally (a) turbulent plasma heating using electron beams with the required return current and d.c. electric fields, (b) the vacuum spark which may be used as an intense X-ray source. Contribution - this work is a part of a comprehensive program of plasma research for the development of an X-ray radiation source for simulation of nuclear weapon effects, the development of space and ionospheric communications and the development of countermeasures.

This research will investigate turbulent plasma heating processes taking place in plasma-electron beam interaction including the effects of the return current and turbulent plasma heating when d.c. electric fields are employed. These data can be scaled to plasma heating employing relativistic electron beams and their use to produce an intense X-ray source. In addition they will test the efficiency capability of a vacuum spark device as an intense X-ray source. More specifically they will measure - a. The d.c. anomalous resistivity and heated plasma energy distributions due to the return current and a d.c. electric field, b. The heating efficiency of double layers to produce very intense electron beams, c. The X-ray yield and the time dependence of the soft to hard X-ray intensity from a very fast, high-energy vacuum spark.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0004, THE INTERACTION OF ELECTROMAGNETIC RADIATION WITH SOLID MATERIALS

A.A. Maradudin, University of California, Irvine Campus, School of Physical Sciences, Dept. of Physics, *Irvine, California* 92664 (DF041700; F49620-78-C-0019)

AF function - aerospace communications, surveillance and detection systems require electro-optical devices which exploit special properties and interactions of infrared radiation with solid-state materials. Opportunity - infrared materials research has high potential for airborne and satellite applications. Objective - this is a theoretical research effort to investigate the interaction of electromagnetic radiation with solid materials, to investigate fundamental processes and elementary excitations that occur mainly in the infrared region of the electromagnetic spectrum, and to study bulk and surface optical properties as well as nonlinear optical phenomena in solids. How work contributes - the far infrared optical properties of these materials are important to the development of infrared detectors and coherent sources integrated optics and electro-optical techniques, and high-energy infrared laser windows and mirrors as well as interactions of materials subjected to laser beams.

Utilize existing and develop new sophisticated theoretical and computional techniques to investigate the interaction of electromagnetic radiation with solid materials. Investigate fundamental processes and elementary excitations that occur mainly in the infrared region of the electromagnetic spectrum. Study, theoretically, bulk optical properties of solids, surface optical properties of solids, and nonlinear optical phenomena in solids. Study the consequences of the inelastic scattering of electrons from ionized impurties in a doped semiconductor on infrared absorption in the drude tail. Study the additional structure introduced into the infrared absorption spectrum of a p-type semiconductor, of the zincblende structure, when this absorption band overlaps the transverse optical phonon absorption line. Study the line shape for infrared absorption by localized vibration modes (due to H-ion impurities in alkali-halide crystals). Study the contribution of electron-electron scattering to the real part of the conductivity of a metal in the infrared spectral range. Investigate the effects of impurities on interband absorption in solids. Investigate the inelastic scattering of light from a plasmon coupled to localized vibration modes in semiconductors. Attempt to construct a theory of the refraction and reflection of surface polaritons at interfaces for the infrared spectral interval, and a theory of the brillouin scattering of light from an opaque solid.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0005, THERMAL PROPERTIES OF SOLID HELIUM-3 AT VERY LOW TEMPERATURES

A.S. Greenberg, Colorado State University, School of Natural Sciences, Dept. of Physics, *Fort Collins, Colorado* 80523 (DMR78-09427)

A thermal conductivity apparatus will be modified so that constant volume and constant pressure samples of BCC 3He can be examined in a magnetic field. Systems comprised of solid helium isotopic mixtures in which spinodal decomposition has been observed will be investigated. Further studies of low-temperature amorphous systems will be made by means of CW ultrasonic spectroscopy. This is a continuation of work begun under DMR76-21341.

Solid helium-3 is of fundamental importance to understanding the quantum nature of condensed matter. This work will clarify the anomalous behavior of solid helium-3 at temperatures below 100 mK.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0006, RADIO-FREQUENCY AND LASER SPECTROSCOPY OF BASIC MOLECULES

W. Lichten, Yale University, Graduate School, Dept. of Physics, *206 Elm, New Haven, Connecticut* 06520 (PHY7826138)

A program of high-resolution, high-precision, laser spectroscopy of fundamental atomic systems will be continued. The purpose of this research will be two-fold: 1 - to test the theory of one- and two-electron atomic system; 2 - to measure natural constants to higher precision than previous values.

The first experiment will be a measurement of the 2s-3p transition in atomic hydrogen to one part in 10 to the 8th power, to confirm the recent measurements of Hansch et al. Succeeding measurements will aim for a precision of 2 parts in 10 to the 9th

power. These experiments will give new values for the Rydberg constant.

An investigation will be made of the feasibility of high-precision measurements of the spectrum of atomic helium, in order to test the theory of two-electron systems more critically than has been possible in the past.

This is the first year of a two-year continuing grant, currently supported under NSF grant PHY75-03264A02.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0007, PLASMA PROCESSES IN SPACE

D. Papadopoulos, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880025)

Understand the basic plasma mechanisms operating in the ionospheric and magnetospheric plasma, including ionospheric irregularities and their effects on electromagnetic wave propagation. Study the ionospheric and magnetospheric behavior and response resulting from both natural and artificial stimuli. Propose active experiments utilizing the ionospheric and magnetospheric plasma as an active medium for production of e-m radiation.

A combination of theoretical and computational techniques will be used. Isolated plasma processes of importance to the space environment will be studied by particle, Vlasov or nonlinear mode coupling codes. Macroscopic phenomena and systems will be modeled with multidimensional multifluid codes with phenomenological transport coefficients.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

8.0008, INTERACTIONS OF RADIATION WITH POSITIVE IONS AND NEUTRAL ATOMS 14560-P

S.T. Manson, Georgia State University, School of Arts & Sciences, Dept. of Physics, *33 Gilmer St. S.E., Atlanta, Georgia* 30303 (DA0F8955; DAAG29 77 G0068)

To perform theoretical investigations of the interaction of charged particles and electromagnetic radiation with positive ions and neutral atoms and determine the details of the mechanisms of energy deposition. Relevance - the research is directly related to ongoing work at BRL in the areas of (1) nuclear weapons effects and (2) the X-ray laser.

A first-principles quantum mechanical calculation of cross sections of photoionization from individual atomic subshells, phase shifts, inelastic scattering form factors, generalized oscillator strengths will be performed.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

8.0009, LIGHT SCATTERING STUDIES IN SEMICONDUCTORS AND DISORDERED SOLIDS

M.V. Klein, University of Illinois, Urbana Champaign Campus, School of Liberal Arts & Sciences, Dept. of Physics, *Urbana, Illinois* 61801 (DMR7902780)

The first objective of this program is to determine how elongated impurities in a crystal change their orientation when there are enough of them to interact strongly with one another. Methods to be used include ultrasonic attenuation and velocity measurements, and inelastic scattering of light, by the sound waves and also by the reorienting impurities themselves. Of interest is whether this system behaves like a real glass and like other random, interacting anisotropic systems known as spin glasses. A second objective is to study electron and hole recombination at impurities in alloys of 3-5 compounds, and to compare the behavior of random alloys and alloys of ordered composition prepared by molecular beam epitaxy (MBE). The technique to be used is resonant excitation of bound exciton luminescence of donors and nitrogen centers in gallium arsenide-gallium phosphide alloys and gallium arsenide-aluminum arsenide alloys, and in ordered superlattice structures of gallium arsenide-aluminum arsenide. These measurements will probe the nature of electrons, holes, lattice vibrations, and their mutual interactions in semiconductors with random and ordered compositional variations. A third objective is to study nearly planar random arrays of donors or acceptors buried in a semiconductor. This will be done by Raman scattering and optical studies of materials such as gallium arsenide doped with germanium grown by MBE. Results will be important for an understanding of metal-insulator transitions and plasma oscillations in nearly two dimensions. This is the first year of a three-year continuing grant.

This research previously supported under DMR 7704382 A01.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0010, QUANTUM LIQUIDS

C.J. Pethick, University of Illinois, Urbana Champaign Campus, School of Liberal Arts & Sciences, Dept. of Physics, *Urbana, Illinois* 61801 (DMR7821068)

Research previously supported by DMR7624011. Theoretical research on quantum solids and liquids will be carried out. Particular problems to be studied will include the elementary excitation spectrum of liquid helium (helium-3, helium-4 and dilute mixtures of helium-3 in helium-4), the transport properties of both normal and superfluid helium-3 and relaxation processes in superconductors. This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0011, INVESTIGATION OF NOISE IN SOLIDS AT LOW TEMPERATURES

J. Weber, University of Maryland, College Park Campus, School of Arts & Sciences, Dept. of Physics, *College Park, Maryland* 20742 (DF048190; F49620-77-C-0065)

AF function - gravity gradiometers are being developed to conduct gravity surveys over unmapped ocean areas to determine more precisely the deflection of the vertical along missile flight paths. Deficiency -the missile CEP requirements for the period 1990 are such that the gravity gradiometers will have to have an accuracy of ten to the minus 12 g/m. Although the present technology of electronic components has reduced the thermal noise levels within the system to their equivalent Brownian motion, cryogenics techniques will have to be investigated to make any significant reduction in noise levels to meet the required specifications for future gravity gradiometers. Objective - this research will establish the procedures and cryogenic techniques required to operate future extremely sensitive instrumentation in a controlled environment. Contribution - inertial navigators are ultimately limited in accuracy by the determining of the local gravity field (deflection of vertical). Therefore, improved gravity gradiometers will provide the necessary data to determine the deflection of vertical during flight paths or operation.

Different materials will be selected to study the noise and attenuation factors at liquid nitrogen temperature (4.2 degrees Kelvin). These materials and cryogenic techniques will be investigated to determine their applications for use in gravity gradiometers. The third law of thermodynamics implies that the internal structure will become infinitely stable and the fluctuations quantum limited at sufficiently low temperatures. An objective of the present investigation is to assess how close to the limiting values can be achieved near 4 degrees K. By going to low temperatures, and further development of the present techniques of mounting, surface preparation, isolation and electronics instrumentation, it is hoped to observe the limiting noise in nearly perfect crystals. Material to be investigated will include aluminum, sapphire and niobium.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0012, STUDY OF LASER CRYSTALS

A. Linz, Massachusetts Inst. of Technology, Crystal Physics Lab., *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DN524495; N00014-75-C-0395)

The Navy has a need for efficient blue-green lasers for imaging, communications, and surveillance type applications operating both in the air and under water.

This contractor will grow laser quality crystals of KY(3)F(10):Pr, YF(3):Pr, HfO(2):Ce, and ThO(2):Ce. Successfully grown crystals will be delivered to NRL for laser testing with a 0.1 joule pulsed dye laser or pulsed mercury lamps.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0013, A STUDY OF THE METAL-GAAS SCHOTTKY BARRIER

R.J. Bell, University of Missouri, Rolla Campus, School of Arts & Sciences, Dept. of Physics, *103 Parker Hall, Rolla, Missouri* 65401 (DF042610; AFOSR-76-2938)

AF function - microwave solid-state electronic devices are essential elements of Air Force surveillance, electronic countermeasures, and communication systems. Opportunity - the metal-GaAs Schottky barrier junction shows great promise for improving the performance of microwave devices for these systems. However, little is known about the metal-GaAs interface electronic states that produces the Schottky barrier. Objective - the objective of this research is to study the metal GaAs interface electronic states. How work contributes -this research should provide additional knowledge on the physical nature of metal-GaAs interface electronic states that would indicate how these states could best be used in microwave devices.

The interface electronic states of thick metal layers on GaAs will be studied by optical absorption, internal photoelectric, capacitance-voltages, and electron energy-loss techniques. Also, the role of oxygen at Schottky barrier junctions will be studied.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0014, ANGULAR RESOLVED ELECTRON EMISSION STUDIES OF MICROWAVE MATERIALS

G.J. Lapeyre, Montana State University, School of Letters & Sciences, Dept. of Physics, *Bozeman, Montana* 59715 (DF041290; F49620-77-C-0125)

AF function - modern aerospace electronic systems depend heavily upon solid-state electronic and optical devices. Opportunity - future improvement in performance of these devices requires a thorough understanding of the electronic structure and excitation processes in selected solids. Present solid-state electronic and optical devices are based upon the properties of a relatively small percentage of the total number of materials potentially available. Objective - the objective of this research program is to provide knowledge on the electronic structure, electronic transitions and interaction, and optical properties for both the bulk and surface states of materials currently under investigation for microwave devices. How work contributes - it is anticipated that this research will provide knowledge which could lead to improvement in solid-state devices that depend on surface effects such as the behavior of junctions and vapor films.

This research program experimentally investigates bulk and surface electronic and optical properties of III-VI semiconductors, and single-crystal metals using angular resolved, polarization dependent and other innovative photoemission techniques in the 2 to 125 ev photon range, Auger electron spectroscopy, low-energy diffraction and energy band analysis.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0015, THERMAL, ELECTRICAL, AND MAGNETIC MEASUREMENTS ON GRANULAR ALUMINUM

P. Lindenfeld, Rutgers the State University of New Jersey, New Brunswick Campus, School of Arts & Sciences, Dept. of Physics, *Old Queens Bldg., New Brunswick, New Jersey* 08903 (DMR7824213)

This research is a continuation and extension of work initially supported under grant DMR 7622967. The evaporation of aluminum in an oxygen atmosphere produces granular films which consist of metal grains surrounded by an insulating oxide. Depending on the details of the deposition, the grains may be in close contact or they may be only weakly coupled; consequently, the resulting composite material may be a metal, semiconductor or insulator. Thus, granular aluminum is a system in which one can study the interplay of a variety of superconducting and normal-state properties; of these, the most interesting are those related to the change of coupling between grains in the narrow range of composition near the metal-insulator transition. Measurements of the heat capacity, electrical and thermal conduction, Hall effect and magnetic susceptibility will be performed in order to characterize and correlate changes in these properties with changes in the structure of the granular films. This work is important to our fundamental understanding of this interesting class of superconducting composites as well as amorphous materials in general. Both areas of research are of central importance to the low-temperature physics program.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0016, HIGH-RESOLUTION ATMOSPHERIC TRANSMITTANCE STUDY 13746-GS

R.L. Armstrong, New Mexico State University, Las Cruces Campus, School of Arts & Sciences, Dept. of Physics, *University Park, Las Cruces, New Mexico* 88003 (DA0F8997; DAAG29 77 G0127)

To conduct a high-resolution spectral study of the nu sub 2 fundamental of CO sub 2 at 15 um emphasizing the q-branch profiles. Relevance - broadband transmission is important in the design and operation of laser-aided night vision devices, meteorological satellite borne infrared radiometers used to obtain atmospheric temperature profiles, and instrumentation for pollution monitoring.

An infrared tunable semiconductor diode laser source will be used to obtain experimental spectral profiles of the gas in a multipass white cell. Spectra taken under different conditions of temperature and pressure will be used to assess the importance of the different broadening and correlation effects. Complimentary theoretical research will involve computer generation of theoretical line shape profiles as a function of both temperature and pressure.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

8.0017, A PROPOSAL TO CONDUCT LASER RADAR RESEARCH FOR MEASURING ATMOSPHERIC TEMPERATURE PROFILES 12835-GS

J.A. Cooney, Drexel University, School of Science, Dept. of Physics, *32nd & Chestnut Sts., Philadelphia, Pennsylvania* 19104 (DA0G5570; DAAG29 75 G0101)

The research seeks to determine in detail the feasibility of measurement of vertical temperature profiles in the atmosphere using a ruby laser and monitoring two separate portions of the Raman rotational backscatter of N sub 2 and O sub 2 from altitudes up to 4-5 km. A program of signal enhancement will also be undertaken involving spectroscopic studies of the O sub 2 line at 7600A. Relevance - accurate and real-time sensing of temperature as a function of altitude has many areas of military interest. Knowledge of atmospheric temperature profiles is important to artillery accuracy in the propagation of a laser beam and in the transport and diffusion of Cb agents. Because of this importance the research fits directly into the automated meteorological system being developed by the Army.

The work involves the design and construction of a dual-channel laser radar. After extensive testing and calibration of all subassemblies in the laboratory, temperature profiles will be acquired in the field and compared with profiles obtained by other methods.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

8.0018, COMMUNICATIONS - MAGNETIC MEMORY MATERIALS AND LIQUID CRYSTALS

H. Callen, University of Pennsylvania, School of Arts & Sciences, Dept. of Physics, *34th & Spruce Sts., Philadelphia, Pennsylvania* 19104 (DN475096; N00014-76-C-0106)

This work is concerned with the development of improved magnetic materials useful to the Navy as memory components in computers, for logic applications and for display devices in its communications and surveillance operations.

It is proposed to analyze the preferential-site ordering mechanism which determines uniaxial anisotropy in garnets. This will provide a new method of determining the dynamics and mechanism of crystal growth in such materials. Such information is needed for improving magnetic materials useful in magnetic bubble technology. Domain hardness, wall mobility and velocity saturation are among the areas to be investigated. In addition a study will be made of modern critical phenomena theory and phase transitions in liquid crystals.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, INSTRUMENTATION FOR PHOTOELECTRIC NEAR-INFRARED PHOTOMETRY

N.M. White, Lowell Observatory, *P.O. Box 1269, Flagstaff, Arizona* 86001 (AST7814468)

Basic photometric equipment including interference filters, a high-efficiency photomultiplier tube, and modern photon counting equipment will be provided to Lowell Observatory. The equipment will replace deteriorating filters and aging instrumentation which has been in use for the last decade.

The equipment will be used to continue a long-term program of study of cool stars with spectral types of later than K4. A new independent calibration of the absolute magnitudes of M-type supergiants will be made. A successful determination of the intrinsic brightness of these luminous stars will facilitate their use as tracers of the spiral structure within our galaxy. Other programs of research on the variation of temperature, pressure and molecular abundance as a function of stellar brightness will also be conducted.

The Lowell Observatory offers observing facilities to visiting astronomers. This equipment will be available to the visitors and to all staff members.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0002, STUDIES OF EXTRAGALACTIC INFRARED SOURCES

G.H. Rieke, University of Arizona, Steward Observatory, *Tucson, Arizona* 85721 (AST7822482)

The infrared sources which dominate the luminosity of many galactic nuclei will be studied with a broad range of techniques, including spectroscopy, photometry, mapping, and polarimetry. Normal spiral galaxies, which we have already shown to contain heavily obscured nuclear sources about 30 times more powerful than those seen in the visible, will be studied spectroscopically and photometrically to determine the stellar population and birthrate functions, and to measure the structure of the infrared sources. Seyfert galaxy nuclei, which we have shown to emit typically 90% of their luminosity in the infrared, will be studied spectroscopically and polarimetrically and monitored for variability to determine the nature of the infrared emission and the role of dust in these sources. Elliptical galaxies will be surveyed for excess infrared emission and the nature of their nuclear sources will be explored photometrically and polarimetrically.

Intensive development has resulted in recent substantial advances in the photometers, polarimeters, and spectrometers available to this program; all of the instruments to be employed are near or define the current state of the art. The multiple-mirror telescope which will be the largest telescope in the world optimized for infrared observations will become available to us soon. These instrumental advances will be used to extend substantially our understanding of extragalactic infrared sources.

This is a continuation of AST76-81874A01.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0003, A MILLIMETER-WAVE INTERFEROMETER AND A SUB-MILLIMETER RADIOMETRIC TELESCOPE

R.B. Leighton, California Inst. of Technology, Graduate School, Dept. of Physics Mathematics & Astron, *1201 E. California Blvd., Pasadena, California* 91109 (AST7613334 A02)

A millimeter-wave interferometer will be built and integrated into the operation of the Owens Valley Radio Observatory of Cal Tech. Accompanying the interferometer will be an ultra-precise 10-meter diameter radiometric telescope for use at wavelengths as short as 350 microns - a factor of seven improvement over current 10-meter diameter telescopes. The interferometer will consist of three 10-meter diameter telescopes separated by up to one kilometer. This gives an effective resolving power of 0.2 seconds of arc at a wavelength of one millimeter. The ability to see such fine details is needed in the studies of: Protostars in the process of collapse; The distribution of molecules in the interstellar medium; The thermal radiation from planets and satellites in the solar system; The distribution of molecules and isotopes in other galaxies; The lower levels of the solar atmosphere where solar flares occur.

This is a continuation of research previously supported by NSF Grant AST 76-13334.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0004, SUPERNOVAE AND EXTRAGALACTIC RESEARCH

W.L. Sargen, California Inst. of Technology, Hale Observatory, *1201 E. California Blvd., Pasadena, California* 91109 (AST7823795)

The programs to discover supernovae with the 18-inch Schmidt telescope at Palomar and to carry out various lines of extragalactic research with the large reflectors at the Hale Observatories are to be continued. The research is divided into four main topics: a) Continuation of the Palomar Supernova Search, which has been responsible for two-thirds of the supernovae discovered in modern times; b) Continued high-resolution spectroscopy of QSO absorption lines. The programs will be designed to investigate the gaseous heavy element content of the halos of nearby galaxies such as M31 and to investigate the halos of galaxies and also the intergalactic medium at large redshifts. c) Further work on the evidence for supermassive objects in the center of M87 and other active galaxies; and d) Searches for nearby dwarf irregular galaxies that are rich in neutral hydrogen in order to set limits on the composition (particularly the helium abundance) of primordial gas.

This is a continuation of AST76-81089A01.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0005, STRUCTURE OF STELLAR SYSTEMS

I.R. King, University of California, Berkeley Campus, School of Letters & Science, Dept. of Astronomy, *Berkeley, California* 94720 (AST7807492)

The research is aimed at understanding the dynamical structure of systems that are basically stellar - where the dominant problems are those of stars rather than gas. Although the basic bent is theoretical, the immediate need has most often been for observational facts to guide the theory. Typically, the needed data are not available and it is necessary to get them. This was the case for globular cluster, where the observed density profiles (in particular the tidal limits) showed what the essential characteristics of the dynamics must be; and it is certainly true of elliptical galaxies, where the observational facts are just beginning to emerge.

The structure of stellar systems is connected in inevitable and valuable ways with the nature of the stars that make them up.

Thus it is natural that this project should concern itself with stellar populations and even to some extent with stellar evolution. These connections exist in different but comparably important ways in the dynamical evolution of star clusters, the relation between the Galactic disc and halo, and the early evolution of galaxies.

Finally, in the course of observational work this project has often concerned itself with techniques, particularly in the area of data reduction and measurement of photographic plates. Not only have new methods and algorithms been developed; where possible, they have been made available to other astronomers through formal or informal channels.

This is a continuation of grant AST76-00530 A02.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0006, EXTERNAL GALAXIES AND QUASI-STELLAR OBJECTS

E.M. Burbidge, University of California, San Diego Campus, Graduate School, Dept. of Physics, *P.O. Box 109, La Jolla, California* 92037 (AST7722560A01)

A combined observational and theoretical program of research on problems of the physics of quasars and related extragalactic objects will be carried out using the 3-m and 4-m telescopes at Lick, Kitt Peak, and Cerro Tololo Interamerican Observatories. Quasars are generators of very large amounts of energy, by processes still little understood. Their relationship to the active centers of galaxies--radio galaxies, Seyferts, etc., and their role in the evolutionary history of galaxies and universe, are parts of the puzzle which they present. The problem of the source of their large outpourings of energy from very small volumes, and their possible connection with states of matter (gravitationally collapsed matter, black holes, etc.) unattainable on earth, make these objects interesting to physicists as well as astronomers, and also of general popular interest.

Particular attention will be devoted to quasars with very large redshifts which may be the most distant visible objects in the universe. Identification work and redshift measurements for very faint radio galaxies will also be carried out, to help map the expansion of the universe and its evolutionary history.

The research is timely now, with the prospect of new research in these fields being expanded by the Space Telescope and other Shuttle-related space experiments.

This is a continuation of research done under AST77-22560.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0007, INTERPLANETARY STUDIES

M. Dryer, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab., *Boulder, Colorado* 80302 (8DJ4 15 30)

PROJECT OBJECTIVE: To understand the transfer of mass, energy, and momentum from the sun to the various obstacles in the solar system. Study of the steady and non-steady state of the interplanetary medium (including its interaction with planetary magnetospheres, ionospheres and comets) which will lead to an improved understanding of the sun's effect on the earth's magnetosphere. Of particular interest is the computer simulation of mass ejecta from solar flares through the inner corona and throughout interplanetary space. This desired knowledge is a necessary 'input' to questions regarding solar effects upon the magnetosphere, ionosphere and possibly even global weather patterns following solar flares or passage past the earth of inhomogeneous wind structure.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab.

10.0008, THE EFFECTS OF TRANSPORT PHENOMENA IN THE SOLAR TRANSITION REGION ON COMPUTED EUV LINE PROFILES

D.E. Billings, University of Colorado, Boulder Campus, School of Arts & Sciences, Dept. of Astro Geophysics, *1200 University Ave., Boulder, Colorado* 80302 (ATM7822202)

Solar spectroscopic line profiles contain a great deal of information about the physical processes occurring in the solar atmosphere. In order to extract this information from the observations, it is necessary to understand how heavy ions (responsible for the line emission) behave in the presence of large temperature and density gradients and various magnetic field configurations. This study will derive velocity distribution functions, for several ions formed in the solar chromosphere-corona transition region, from the Boltzmann-Fokker-Planck equation, in the limit of a collision dominated gas. This would include the effects of thermal diffusion, various magnetic field configurations, non-Maxwellian electron and proton distribution functions and MHD and plasma instabilities (where appropriate) on the ion distribution in phase space. Given the ion distribution function as a function of height in the solar transition region, it will then be possible to compute theoretical line profiles to compare with observations. In this way, a technique is established for evaluating the validity of existing and future transition region-corona models. The overall aim is to understand the thermal properties of the sun.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

10.0009, X-RAY ENVIRONMENTAL LIMITS TO MILITARY SYSTEMS HARD X-RAY AND GAMMA-RAY ASTRONOMY

J.D. Kurfess, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN480107)

To monitor the hard X-ray and gamma-ray environment in the upper atmosphere and in space, including solar emissions, cosmic gamma-ray bursts, intense celestial sources and the atmospheric/magnetospheric background. Solar gamma-ray emission is of interest because of the potential for an improved prediction capability for flare-related communications disturbances. Improved detection capabilities are also required for monitoring high-altitude nuclear tests and for satellite inspection.

Sensitive gamma-ray detectors are flown on stratospheric balloons and satellites to monitor the gamma-ray environment. Extended observations are required to meet the objectives; therefore a ballon-borne system capable of around-the-world flight durations of 100 days or longer has been developed for use with long-duration balloon systems. Designs for imaging hard X-ray and gamma-ray detectors are also being studied.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

10.0010, DEFINITIVE CATALOG OF POSITIONS AND PROPER MOTIONS OF STARS BETWEEN DECLINATION 70 DEGREES S AND THE SOUTH POLE

H.K. Eichhorn, State University System of Florida, University of South Florida, School of Natural Sciences, Dept. of Astronomy, *4202 Fowler Ave., Tampa, Florida* 33620 (AST7620809 A02)

In the plan to construct, over all the sky, an independent catalogue of star positions complete to the magnitude limit set by the Astronomische Gesselschaft, plates of the South Polar Cap were secured by Yale in 1955 and 1956, mostly by the late Dirk Brouwer as one of the last zones to be photographed. These plates were measured during the late sixties and a preliminary reduction of the measurements made, along with preliminary proper motions, derived from a variety of sources. In a continuation of work under a prior grant to Yale University, the definitive reduction will be done as originally planned, using the plate overlap method.

In addition, a near definitive new determination of plate constants for the Melbourne zone of the Astrographic Catalogue, which will immediately provide accurate positions for all stars whose measured coordinates constitute the Melbourne AC, would be a by-product of this work. New and more accurate proper motions of the program stars will be derived.

Prior support was by NSF grant AST 76-20809.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0011, RADIATIVE TRANSFER
W. Kalkofen, Smithsonian Institution, Astrophysical Observatory, *60 Garden St., Cambridge, Massachusetts* 02138 (31T-4T50-07)

Kalkofen finished the work on the complete linearization of the integral equations in radiative transfer and demonstrated the power of the method in the problem of coupled spectral lines in a gas in statistical equilibrium.

With D. Carbon (KPNO), investigation began of the construction of models for atmospheres of very cool stars with highly non-gray opacity, due to atomic and molecular lines, using the method of complete linearization of the equations of radiative transfer and of the conservation equations of radiative and hydrostatic equilibrium.

Kalkofen completed a comparison of the properties of the integral and the differential techniques for solving the equation of radiation transfer.

With E. Leibowitz (Tel-Aviv U.), Kalkofen is investigating the transfer of radiation in the resonance continua of H and He through dusty interstellar clouds.

In collaboration with P. Ulmschneider (Wurzburg U.), Kalkofen is studying the propagation and radiative damping of acoustic waves in the solar atmosphere. (This work is supported by NASA grant NGR 09-015-210).

Richard Klein (Brandeis U.) completed his thesis on the coupling of shock waves and radiative transfer in a stellar atmosphere.

SUPPORTED BY Smithsonian Institution, Astrophysical Observatory

10.0012, RADIO ASTRONOMY - SPECTRAL LINES
A.E. Lilley, Smithsonian Institution, Astrophysical Observatory, *60 Garden St., Cambridge, Massachusetts* 02138

Study of the nature of complex molecules in interstellar space continues. Research includes searches for new molecules with emphasis on supporting laboratory measurements, which permit accurate wavelength determinations. In addition, molecules already discovered in space will be surveyed for their distribution in space. The study of the radiation from the molecules in several excitation states to attempt to understand the causes of the molecular radio radiation is also planned.

SUPPORTED BY Smithsonian Institution, Astrophysical Observatory

10.0013, TIME OF CRAB OPTICAL PULSAR
C. Papaliolios, Smithsonian Institution, Astrophysical Observatory, High Energy Astrophysics Div, *60 Garden St., Cambridge, Massachusetts* 02138 (31H-4H50-00/04; SRF 430064)

Observations of the Crab Nebula pulsar are made to gather sufficient data for an understanding of the dynamics of rotating neutron stars and of the reasons for their occasional departure from a smooth secular slowdown. In addition, searches were conducted for new optical pulsars.

SUPPORTED BY Smithsonian Institution, Astrophysical Observatory

10.0014, DEVELOPMENT OF A LOW-LIGHT-LEVEL IMAGING SYSTEM FOR COSMOLOGICAL INVESTIGATIONS
R.E. Schild, Smithsonian Institution, Astrophysical Observatory, *60 Garden St., Cambridge, Massachusetts* 02138 (460129)

We propose to develop a new astronomical detector based upon the charge coupled devices (CCD's) presently being developed for the television industry. The CCD devices incorporate high quantum efficiency and sensitivity in the near-infrared. We plan to modify such a detector to make long integrations possible, so that very faint astronomical sources can be detected against the sky background. We hope to use this detector to identify very faint galaxies believed to be associated with X-ray sources, and to study faint halos surrounding presently known galaxies.

SUPPORTED BY Smithsonian Institution, Office of Fellowships & Grants

10.0015, RESEARCH IN INFRARED ASTRONOMY AT THE MT. LEMMON OBSERVING FACILITY
W.A. Stein, University of Minnesota, Minneapolis Campus, School of Liberal Arts, Dept. of Physics & Astronomy, *322 Johnston Hall, Minneapolis, Minnesota* 55455 (AST7814464A01)

Observations will be carried out at the Mt. Lemmon Infrared Observing Facility dealing with physical conditions in galactic and extragalactic infrared astronomical sources. The facility includes a wide variety of instruments for the study of astronomical spectra over the visual and infrared wavelength range 0.35 micrograms to 35 micrograms and at submillimeter wavelengths. Scientific problems include: studies of previously unidentified sources discovered from above the terrestrial atmosphere; detection and identification of discrete infrared special features; the polarization and temporal behavior of energetic phenomena in galactic novae and in extragalactic sources; and the nature of the source of energy of quasistellar objects and active nuclei of galaxies. The Mt. Lemmon facility has been one of the most productive in the world in this area having served as the origin of work resulting in over 130 published papers during a brief history of seven years. Continued progress requires work in 3 areas: development of new instrumentation; observation and data analysis; and theoretical interpretation. Research of this type is fundamentally valuable in determining properties of astronomical sources at infrared wavelengths, and the research complements astronomical work in optical spectroscopy and in radio and X-ray astronomy.

This is a continuation of work done under grant AST 78-14464.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

GENERAL

11.0001, THE HERITAGE OF AVIATION MEDICINE
R.J. Benford, Aerospace Medical Assn., *Washington Natl. Airport, Washington, District of Columbia* 20001 (R01 LM 02656-02S1)

The objective of this project is to locate and identify existing aviation and medical artifacts, related to flying health and safety, for inclusion in a manuscript of an annotated directory of these historic objects. Such material includes aviators' personal equipment (oxygen masks, protective clothing, helmets, goggles, etc.,; first aid, safety, escape and survival gear; and flight surgeons' examining, testing, and research instruments and equipment. Searches for such collections by questionnaires and on-site inspections are limited to the United States and Canada, and the European countries (United Kingdom, France, West Germany and Italy) with military air forces in World War I. No such directory is known to exist.

SUPPORTED BY U.S. Dept. of Health Education & Welfare, National Inst. of Health, National Library of Medicine

11.0002, TO RIDE THE FRACTIOUS HORSE - THE AMERICAN AERONAUTICAL COMMUNITY AND THE PROBLEMS OF HEAVIER-THAN-AIR FLIGHT, 1875-1905
T.D. Crouch, Smithsonian Institution, Dept. of Astronautics, *1000 Jefferson Dr. S.W., Washington, District of Columbia* 20560

This volume is a study of the birth and evolution of a community of engineers in the United States interested in the problem of heavier-than-air flight prior to 1905. The study concentrates on the education, and interrelationships that bound members to this group as well as the institutional factors that functioned to create an effective community of technical contributors. The volume was awarded the AIAA History Manuscript prize for 1977 and is now being circulated to publishers.

SUPPORTED BY Smithsonian Institution, National Air & Space Museum

11.0003, ROBERT H. GODDARD AND CHARLES A. LINDBERGH
F.C. Durant, Smithsonian Institution, Dept. of Astronautics, *1000 Jefferson Dr. S.W., Washington, District of Columbia* 20560

Goddard and Lindbergh, two outstanding contributors to rocketry and aviation, had a professional relationship during the years 1929.1940. The proposed study would be a chronicle of their meetings and correspondence and commentary on their strongly individual personalities. Sources of information include 'This High Man' by Milton Lehman (Farrar, Stauss), 'The Papers of Robert H. Goddard' (McGraw-Hill), archives of Charles A. Lindbergh at St. Louis, Missouri, and New Haven, Connecticut, as well as interviews with Mrs. Robert H. Goddard and General Lindbergh. Both Mrs. Goddard and General Lindbergh have indicated interest in this project and resultant paper. Authorization by General Lindbergh of access to his archival papers and photographs is on file.

SUPPORTED BY Smithsonian Institution, National Air & Space Museum

American Institute of
Aeronautics and Astronautics

announces

Two New Films

America's Wings

The spirit and joy of creativity as exemplified in aircraft design is the story of this film. America's Wings looks at everything that has happened since Kitty Hawk and the "somebodies" who made it happen. (28.5 minutes, 16 mm color)

The Age of Space Transportation

Every breakthrough in transportation, from the wheel to the jet engine, has brought with it enormous social change. "The Age of Space Transportation" takes a particular look at mankind's next giant step in moving around -- the Space Shuttle, the vehicle itself and its implications. (20 minutes, 16 mm)

For information on obtaining these films, contact:
American Institute of Aeronautics and Astronautics
1290 Avenue of the Americas
New York, N.Y. 10019

VOLUME 17 NUMBER 18 / SEPTEMBER 23, 1979

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N79-27068* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 110
Jun. 1979 145 p
(NASA-SP-7037(110)) Avail: NTIS HC E02 CSCL 01A

This bibliography lists 504 reports, articles, and other documents introduced into the NASA scientific and technical information system in May 1979. Author

N79-27069# Civil Aeronautics Board, Washington, D.C.
CIVIL AERONAUTICS BOARD REPORTS TO CONGRESS, FISCAL YEAR 1977 AND TRANSITIONAL QUARTER Annual Report
GPO May 1978 162 p refs
Avail: NTIS MF A01; SOD HC

Highlights of CAB activities are discussed under the following topics: route program; rate regulation; subsidy; economic analysis; economic enforcement; accounting and reporting; consumer advocacy; community and Congressional relations; court cases; administration; legislative developments; and international air transportation. Tabular data is included. A.R.H.

N79-27070*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SCIENCE AND TECHNOLOGY OF LOW SPEED AND MOTORLESS FLIGHT. THIRD INTERNATIONAL SYMPOSIUM
Perry W. Hanson, comp. Jun. 1979 702 p refs Symp. held in Hampton, Va., 29-30 Mar. 1979; sponsored by NASA-Langley and Soaring Soc. of Am.
(NASA-CR-2085; L-12973) Avail: NTIS HC A99/MF A01 CSCL 02A

Low speed aerodynamics of sailplanes and hang gliders are discussed. Emphasis is placed on optimal flight techniques, structures and materials, and ultralight design. For individual titles, see N79-27071 through N79-27085.

N79-27071*# Iowa State Univ. of Science and Technology, Ames.
MINIMUM ALTITUDE-LOSS SOARING IN A SPECIFIED VERTICAL WIND DISTRIBUTION **c05**
Bion L. Pierson and Imao Chen *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 305-318 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

Minimum altitude-loss flight of a sailplane through a given vertical wind distribution is discussed. The problem is posed as an optimal control problem, and several numerical solutions are obtained for a sinusoidal wind distribution. J.M.S.

N79-27072*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A STUDY OF COURSE DEVIATIONS DURING CROSS-COUNTRY SOARING **c05**
Steven M. Sliwa and David J. Sliwa (Ill. Univ. at Urbana-Champaign) *In its* Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 319-353 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

Several models are developed for studying the impact of deviations from course during cross country soaring flights. Analyses are performed at the microstrategy and macrostrategy levels. Two types of lift sources are considered: concentrated thermals and thermal streets. The sensitivity of the optimum speed solutions to various model, piloting and performance parameters is evaluated. Guides are presented to provide the pilot with criterions for making in-flight decisions. In general, course deviations are warranted during weak lift conditions, but are less justifiable with moderate to strong lift conditions.Author

N79-27073*# Liege Univ. (Belgium).
ON GLOBAL OPTIMAL SAILPLANE FLIGHT STRATEGY **c04**
Guy J. Sander and Francois-Xavier Litt *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 355-375 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 17G

The derivation and interpretation of the necessary conditions that a sailplane cross-country flight has to satisfy to achieve the maximum global flight speed is considered. Simple rules are obtained for two specific meteorological models. The first one uses concentrated lifts of various strengths and unequal distance. The second one takes into account finite, nonuniform space amplitudes for the lifts and allows, therefore, for dolphin style flight. In both models, altitude constraints consisting of upper and lower limits are shown to be essential to model realistic problems. Numerical examples illustrate the difference with existing techniques based on local optimality conditions. J.M.S.

N79-27074*# Medizinische Hochschule Hannover (West Germany).
BALANCE TRAINING OF THE EQUILIBRIUM ORGAN AND ITS EFFECT ON FLIGHT STRATEGY **c52**
Klaus D. Eikemeier, H.-D. Melzig (DFVLR, Brunswick, West Ger.), N. Reicke, and W. Schmidt *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 377-388 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 06P

An experimental program was conducted with the pendular platform of the Oto-Rhino-Laryngology Clinic, which was developed for the investigation of disturbances of the equilibrium. The equilibrium sense of the glider pilot was emphasized. Results are presented. J.M.S.

N79-27075*# Corning Glass Works, N.Y.
A MONTE CARLO APPROACH TO COMPETITION STRATEGY **c66**

Michael P. Teter *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 389-397 (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 12B

Variables taken into account in glider flight strategy decisions are modeled. These include height of clouds, distance between thermals, time of day, water ballast, present altitude, weather changes, lift organization, and distance to goal, as well as the strength of the next thermal. Results of the Monte Carlo atmospheric model are discussed. J.M.S.

N79-27076*# Stuttgart Univ. (West Germany). Inst. A for Mechanics.
A GENERAL METHOD FOR THE LAYOUT OF AILERONS AND ELEVATORS OF GLIDERS AND MOTORPLANES **c05**
Manfred H. Hiller *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 399-418 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

A method is described which allows the layout of the spatial driving mechanism of the aileron for a glider or a motorplane to be performed in a systematic manner. In particular, a prescribed input-output behavior of the mechanism can be realized by variation of individual parameters of the spatial four-bar mechanisms which constitute the entire driving mechanism. By means of a sensitivity analysis, a systematic choice of parameters is possible. At the same time the forces acting in the mechanism can be limited by imposing maximum values of the forces as secondary conditions during the variation process. J.M.S.

N79-27077*# Politecnico di Torino (Italy).
EXPERIMENTAL INVESTIGATION INTO THE FEASIBILITY OF AN EXTRUDED WING **c05**
Piero Morelli and Giulio Romeo *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 419-436 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

Fabrications of extruded aluminum alloy structures are reviewed. The design criteria and the fabrication of the main structure of a sailplane wing made of a few extruded profiles longitudinally connected one to the other are illustrated. Structural tests recently carried out are reported upon. J.M.S.

N79-27078*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TREATMENT OF THE CONTROL MECHANISMS OF LIGHT AIRPLANES IN THE FLUTTER CLEARANCE PROCESS **c08**
Elmar J. Breitbach *In its* Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 437-466 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

It has become more and more evident that many difficulties encountered in the course of aircraft flutter analyses can be traced to strong localized nonlinearities in the control mechanisms. To cope with these problems, more reliable mathematical models paying special attention to control system nonlinearities were established by means of modified ground vibration test procedures in combination with suitably adapted modal synthesis approaches. Three different concepts are presented. J.A.M.

N79-27079*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany).
ADVANCED COMPOSITES IN SAILPLANE STRUCTURES: APPLICATION AND MECHANICAL PROPERTIES **c05**
Dieter Muser *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 467-483 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

Advanced Composites in sailplanes mean the use of carbon and aramid fibers in an epoxy matrix. Weight savings were in the range of 8 to 18% in comparison with glass fiber structures. The laminates will be produced by hand-layup techniques and all material tests were done with these materials. These values may be used for calculation of strength and stiffness, as well as for comparison of the materials to get a weight-optimum construction. Proposals for material-optimum construction are mentioned. J.A.M.

N79-27080*# Boeing Commercial Airplane Co., Seattle, Wash.
THE ULTRALIGHT SAILPLANE **c05**
John H. McMasters *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 485-504 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

As presently envisioned, the ultralight sailplane is intermediate in size, cost and performance between current hang gliders and the lower end of the traditional sailplane spectrum. In the design of an ultralight sailplane, safety, low cost, and operational simplicity were emphasized at the expense of absolute performance. An overview of the design requirements for an ultralight sailplane is presented. It was concluded that by a judicious combination of the technologies of hang gliding, human powered flight, conventional soaring and motor gliding, an operationally and economically viable class of ultralight, self-launching sailplanes can be developed. J.A.M.

N79-27081*# Stanford Univ., Calif.
ANALYTICAL AND SCALE MODEL RESEARCH AIMED AT IMPROVED HANGGLIDER DESIGN **c05**
Ilan Kroo and Li-Shing Chang *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 505-521 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

Research consisted of a theoretical analysis which attempts to predict aerodynamic characteristics using lifting surface theory and finite-element structural analysis as well as an experimental investigation using 1/5 scale elastically similar models in the NASA Ames 2m x 3m (7' x 10') wind tunnel. Experimental data were compared with theoretical results in the development of a computer program which may be used in the design and evaluation of ultralight gliders. J.A.M.

N79-27082*# Instytut Lotnictwa, Warsaw (Poland).
IMPROVEMENT OF HANG GLIDER PERFORMANCE BY USE OF ULTRALIGHT ELASTIC WING **c05**
Jerzy S. Wolf *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 523-536 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

The problem of the lateral controllability of the hang glider by the pilot's weight shift was considered. The influence of the span and the torsional elasticity of the wing was determined. It was stated that an ultralight elastic wing of a new kind was most suitable for good control. The wing also has other advantageous properties. J.A.M.

N79-27083*# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Aerospace Mechanics Div.
EXPERIMENTAL STUDY OF THE FLIGHT ENVELOPE AND RESEARCH OF SAFETY REQUIREMENTS FOR HANG-GLIDERS **c05**
Claudius LaBurthe *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 537-556 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

The flight mechanic computations were computed, providing both the flight envelopes with all sorts of limits and a fairly precise idea of the influence of several parameters, such as pilot's weight, wing settings, aeroelasticity, etc. The particular problem of luffing dives was thoroughly analyzed, and two kinds of causes were exhibited in both the rules of luffing and aeroelastic effects. The general analysis of longitudinal stability showed a strong link with fabric tension, as expected through Nielsen's and Twaites' theory. Fabric tension strongly depending upon aeroelasticity, that parameter was found to be the most effective design one for positive stability. Lateral stability was found to be very similar in all gliders except perhaps the cylindro-conical. The loss of stability happens in roll at low angle of attack, whereas it happens in yaw at high angle. Turning performance was a bit suprising, with a common maximum value of approximately 55 deg of bank angle for a steady turn. Author

N79-27084*# Army Research and Technology Labs., Moffett Field, Calif. Aeromechanics Lab.
WIND TUNNEL TESTS OF FOUR FLEXIBLE WING ULTRALIGHT GLIDERS **c02**
Robert A. Ormiston *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 557-589 (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01A

The aerodynamic lift, drag, and pitching moment characteristics of four full scale, flexible wing, ultralight gliders were measured in the settling chamber of a low speed wind tunnel. The gliders were tested over a wide range of angle of attack and at two different velocities. Particular attention was devoted to the lift and pitching moment behavior at low and negative angles of attack because of the potential loss of longitudinal stability of flexible wing gliders in this regime. The test results were used to estimate the performance and longitudinal control characteristics of the gliders. J.A.M.

N79-27085*# Aeromechnical Technology Services, Mansfield, Ohio.
CONTEMPORARY SOARING NOMENCLATURE
Samo Onjegin Jenko *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 591-593 (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 02A

Considerable technical progress took place during the past two decades in the field of soaring. In contrast, basic terminology in many languages is lagging seriously. English, one of the leading languages, is no exception. Because of this situation, misunderstandings occur which under some circumstances may result in undesirable consequences, hindering further technical developments as well as soaring activities. Definitions were established and compiled by mid-1973, followed by minor additions (1974 and 1977). J.A.M.

N79-27086*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TECHNOLOGY REQUIREMENTS AND READINESS FOR VERY LARGE VEHICLES
D. William Conner Jun. 1979 11 p Presented at the AIAA Very Large Vehicle Conf., Arlington, Va., 26-27 Apr. 1979
(NASA-TM-80127) Avail: NTIS HC A02/MF A01 CSCL 02A

Common concerns of very large vehicles in the areas of economics, transportation system interfaces and operational problems were reviewed regarding their influence on vehicle configurations and technology. Fifty-four technology requirements were identified which are judged to be unique, or particularly critical, to very large vehicles. The requirements were about equally divided among the four general areas of aero/hydrodynamics, propulsion and acoustics, structures, and vehicle systems and operations. The state of technology readiness was judged to be poor to fair for slightly more than one half of the requirements. In the classic disciplinary areas, the state of technology readiness appears to be more advanced than for vehicle systems and operations. S.E.S.

N79-27087*# Milco International, Inc., Huntington Beach, Calif.
STATE OF THE ART SURVEY OF TECHNOLOGIES APPLICABLE TO NASA'S AERONAUTICS, AVIONICS AND CONTROLS PROGRAM
Richard K. Smyth, ed. May 1979 332 p refs Prepared in cooperation with ORI, Inc., Silver Spring, Md.
(Contract NASw-2961)
(NASA-CR-159050) Avail: NTIS HC A15/MF A01 CSCL 02A

The state of the art survey (SOAS) covers six technology areas including flightpath management, aircraft control system, crew station technology, interface & integration technology, military technology, and fundamental technology. The SOAS included contributions from over 70 individuals in industry, government, and the universities. Author

N79-27088*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
CORRELATION OF PREDICTED AND MEASURED THERMAL STRESSES ON AN ADVANCED AIRCRAFT STRUCTURE WITH DISSIMILAR MATERIALS
Jerald M. Jenkins Jun. 1979 47 p refs
(NASA-TM-72865; H-1092) Avail: NTIS HC A03/MF A01 CSCL 02A

Additional information was added to a growing data base from which estimates of finite element model complexities can be made with respect to thermal stress analysis. The manner in which temperatures were smeared to the finite element grid points was examined from the point of view of the impact on thermal stress calculations. The general comparison of calculated and measured thermal stresses is quite good and there is little doubt that the finite element approach provided by NASTRAN results in correct thermal stress calculations. Discrepancies did exist between measured and calculated values in the skin and the skin/frame junctures. The problems with predicting skin thermal stress were attributed to inadequate temperature inputs to the structural model rather than modeling insufficiencies. The discrepancies occurring at the skin/frame juncture were most likely due to insufficient modeling elements rather than temperature problems. A.R.H.

N79-27089*# National Aeronautics and Space Administration, Washington, D. C.
SIXTY YEARS OF AERONAUTICAL RESEARCH, 1917-1977
David A. Anderton 1978 96 p
(NASA-EP-145) Avail: NTIS MF A01; SOD HC CSCL 02A

The history of Langley Research Center and its contributions to solving problems related to flight over the past six decades is recounted. Technical innovations described include those related to air craft construction materials, jet and rocket propulsion, flight testing and simulation, wind tunnel tests, noise reduction, supersonic flight, air traffic control, structural analysis, computational aerodynamics, and fuel efficiency. A.R.H.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N79-27090# Tel-Aviv Univ. (Israel). Dept. of Applied Mathematics.
SHOCK FORMATION FROM DISCONTINUITIES IN THE DERIVATIVES OF SOLUTIONS OF NONLINEAR HYPERBOLIC SYSTEMS Final Scientific Report
Liviu Lustman Jul. 1977 124 p refs
(Grant AF-AFOSR-2561-73)
(AD-A059201) Avail: NTIS HC A06/MF A01 CSCL 12/1

A unified study of gradient discontinuities propagating in solutions of nonlinear systems is presented. Equations were formulated, which govern the magnitude of such a discontinuity; their solution showed that in general infinite gradients must appear. Various methods, applicable to special cases, were merged and extended enabling general, multidimensional situations with explicit time dependence to be considered. Several applications to physically relevant problems are presented. R.E.S.

N79-27091*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
WIND FIELD AND TRAJECTORY MODELS FOR TORNADO-PROPELLED OBJECTS Final Report
Gunther H. Redmann, John R. Radbill, Jack E. Marte, Paul Dergarabedian, and Francis E. Fendell 2 May 1978 246 p refs Sponsored in part by Electric Power Research Inst.
(Contract NAS7-100)
(NASA-CR-158775; JPL-Pub-78-57; EPRI-NP-78; FR-2) Avail: NTIS HC A11/MF A01 CSCL 01A

A mathematical model to predict the trajectory of tornado born objects postulated to be in the vicinity of nuclear power plants is developed. An improved tornado wind field model satisfied the no slip ground boundary condition of fluid mechanics and includes the functional dependence of eddy viscosity with altitude. Subscale wind tunnel data are obtained for all of the missiles currently specified for nuclear plant design. Confirmatory

full-scale data are obtained for a 12 inch pipe and automobile. The original six degree of freedom trajectory model is modified to include the improved wind field and increased capability as to body shapes and inertial characteristics that can be handled. The improved trajectory model is used to calculate maximum credible speeds, which for all of the heavy missiles are considerably less than those currently specified for design. Equivalent coefficients for use in three degree of freedom models are developed and the sensitivity of range and speed to various trajectory parameters for the 12 inch diameter pipe are examined. S.E.S.

N79-27092*# Illinois Univ., Urbana-Champaign. Aviation Research Lab.

THE DEVELOPMENT OF METHODS FOR PREDICTING AND MEASURING DISTRIBUTION PATTERNS OF AERIAL SPRAYS Final Report

Allen I. Ormsbee, Michael B. Bragg, and Mark D. Maughmer Jun. 1979 64 p refs

(Grant NsG-1434)

(NASA-CR-158787; ARL-79-1) Avail: NTIS HC A04/MF A01 CSCL 01A

The capability of conducting scale model experiments which involve the ejection of small particles into the wake of an aircraft close to the ground is developed. A set of relationships used to scale small-sized dispersion studies to full-size results are experimentally verified and, with some qualifications, basic deposition patterns are presented. In the process of validating these scaling laws, the basic experimental techniques used in conducting such studies, both with and without an operational propeller, were developed. The procedures that evolved are outlined. The envelope of test conditions that can be accommodated in the Langley Vortex Research Facility, which were developed theoretically, are verified using a series of vortex trajectory experiments that help to define the limitations due to wall interference effects for models of different sizes. A.R.H.

N79-27093*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PERFORMANCE OF A V/STOL TILT NACELLE INLET WITH BLOWING BOUNDARY LAYER CONTROL

Albert L. Johns, Robert C. Williams, and H. C. Potonides (Grumman Aerospace Corp., Bethpage, N. Y.) 1979 13 p refs Presented at the 15th Joint Propulsion Conf., Las Vegas, Nev., 18-20 Jun. 1979; cosponsored by AIAA, SAE and ASME

(NASA-TM-79176; E-043) Avail: NTIS HC A02/MF A01 CSCL 01A

A scale model of a V/STOL tilt nacelle fitted to a 0.508 m single stage fan was tested in the NASA Lewis 9x15 ft low speed wind tunnel to determine the effect of diffuser blowing on the inlet aerodynamics and aeromechanical performance. The test was conducted over a range of freestream speeds (up to 120 knots) and angles of attack (up to 120 deg). Diffuser blowing had a beneficial affect on all performance parameters. The angle of attack range for separation free flow substantially increased, and the fan face distortion significantly reduced with a corresponding increase in total pressure recovery. Discrete narrow band blade stress peaks which were common to the nonblowing (baseline) configuration were eradicated with diffuser blowing. S.E.S.

N79-27094*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ONSET OF CONDENSATION EFFECTS AS DETECTED BY TOTAL PRESSURE PROBES IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL

Robert M. Hall May 1979 53 p refs

(NASA-TM-80072) Avail: NTIS HC A04/MF A01 CSCL 01A

Total pressure probes mounted in the test section of a 0.3 meter transonic cryogenic tunnel were used to detect the onset of condensation effects for free stream Mach numbers of 0.50, 0.75, 0.85, and 0.95 and for total pressure between one and five atmospheres. The amount of supercooling was found to be about 3 K and suggests that condensation was occurring on pre-existing liquid nitrogen droplets resulting from incomplete evaporation of the liquid nitrogen injected to cool the tunnel. The liquid nitrogen injection process presently being used for the 0.3 m tunnel was found to result in a wide spectrum of droplet sizes being injected into the flow. Since the relatively larger droplets took much more time to evaporate than the more numerous smaller droplets, the larger ones reached the test section first as the tunnel operating temperature was reduced. However, condensation effects in the test section were not immediately measurable because there was not a sufficient number of the larger droplets to have an influence on the thermodynamics of the flow. R.E.S.

N79-27095*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

INFLUENCE OF OPTIMIZED LEADING-EDGE DEFLECTION AND GEOMETRIC ANHEDRAL ON THE LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A LOW-ASPECT-RATIO HIGHLY SWEPT ARROW-WING CONFIGURATION

Paul L. Coe, Jr. and Jarret K. Huffman Jun. 1979 53 p refs

(NASA-TM-80083) Avail: NTIS HC A04/MF A01 CSCL 01A

An investigation conducted in the Langley 7 by 10 foot tunnel to determine the influence of an optimized leading-edge deflection on the low speed aerodynamic performance of a configuration with a low aspect ratio, highly swept wing. The sensitivity of the lateral stability derivative to geometric anhedral was also studied. The optimized leading edge deflection was developed by aligning the leading edge with the incoming flow along the entire span. Owing to the spanwise variation of unwash, the resulting optimized leading edge was a smooth, continuously warped surface for which the deflection varied from 16 deg at the side of body to 50 deg at the wing tip. For the particular configuration studied, levels of leading-edge suction on the order of 90 percent were achieved. The results of tests conducted to determine the sensitivity of the lateral stability derivative to geometric anhedral indicate values which are in reasonable agreement with estimates provided by simple vortex-lattice theories. J.M.S.

N79-27096*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AN EXPLORATORY STUDY OF A FINITE DIFFERENCE METHOD FOR CALCULATING UNSTEADY TRANSONIC POTENTIAL FLOW

Robert M. Bennett and Samuel R. Bland Jun. 1979 22 p refs Presented at AIAA/ASME/ASCE/AHS Struct., Structural Dyn., and Mater. Conf., St. Louis, 4-6 Apr. 1979

(NASA-TM-80105; AIAA-PAPER-79-0768) Avail: NTIS HC A02/MF A01 CSCL 01A

A method for calculating transonic flow over steady and oscillating airfoils was developed by Isogai. The full potential equation is solved with a semi-implicit, time-marching, finite difference technique. Steady flow solutions are obtained from time asymptotic solutions for a steady airfoil. Corresponding oscillatory solutions are obtained by initiating an oscillation and marching in time for several cycles until a converged periodic solution is achieved. The method is described in general terms and results for the case of an airfoil with an oscillating flap are presented for Mach numbers 0.500 and 0.875. Although satisfactory results are obtained for some reduced frequencies, it is found that the numerical technique generates spurious oscillations in the indicial response functions and in the variation of the aerodynamic coefficients with reduced frequency. These oscillations are examined with a dynamic data reduction method to evaluate their effects and trends with reduced frequency and Mach number. Further development of the numerical method is needed to eliminate these oscillations. S.E.S.

N79-27097*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

A FLIGHT INVESTIGATION OF BASIC PERFORMANCE CHARACTERISTICS OF A TEETERING-ROTOR ATTACK HELICOPTER

Charles E. K. Morris, Jr. Jun. 1979 114 p refs Sponsored in part by the US Army Aviation Research and Development Command, Hampton, Va.

(NASA-TM-80112) Avail: NTIS HC A06/MF A01 CSCL 01A

Flight data were obtained with an instrumented AH-16 helicopter having uninstrumented, standard main-rotor blades. The

data are presented to facilitate the analysis of data taken when the same vehicle was flown with instrumented main-rotor blades built with new airfoils. Test results include data on performance, flight-state parameters, pitch-link loads and blade angles for level flight, descending turns and pull-ups. Flight test procedures and the effects of both trim variations and transient phenomena on the data are discussed. Author

N79-27098*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AN EXPLORATORY INVESTIGATION OF THE EFFECT OF A PLASTIC COATING ON THE PROFILE DRAG OF A PRACTICAL-METAL-CONSTRUCTION SAILPLANE AIRFOIL

Dan M. Somers and Jean M. Foster Jul. 1979 34 p refs
(NASA-TM-80092; L-11623) Avail: NTIS HC A03/MF A01 CSCL 01A

The Langley low-turbulence pressure tunnel to determine the effect of a plastic coating on the profile drag of a practical-metal-construction sailplane airfoil was investigated. The model was tested with three surface configurations: (1) filled, painted, and sanded smooth; (2) rough bare metal; and (3) plastic-coated. The results are compared with data for the design airfoil (Wortmann FX 67-K-170/17) from another low-turbulence wind tunnel. The investigation was conducted at Reynolds numbers based on airfoil chord of 1.1 x 10 to the 6th power, 2.2 x 10 to the 6th power, and 3.3 x 10 to the 6th power at a Mach number of 0.10. A.R.H.

N79-27099*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PRESSURE DISTRIBUTIONS ON THREE DIFFERENT CRUCIFORM AFT-TAIL CONTROL SURFACES OF A WINGLESS MISSILE AT MACH 1.60, 2.36, AND 3.70 VOLUME 1: TRAPEZOIDAL TAIL

Milton Lamb, Wallace C. Sawyer, Donald L. Wassum, and C. Donald Babb Aug. 1979 345 p
(NASA-TM-80097; L-12993) Avail: NTIS HC A15/MF A01 CSCL 01A

The results of pressure distribution tests conducted in the Langley Unitary Plan wind tunnel are presented. The data were obtained for three sets of cruciform aft-tail control surfaces on a wingless missile model at Mach numbers of 1.60, 2.36, and 3.70 for angles of attack from -4 degrees to 20 degrees, model roll angles from 0 degrees to 90 degrees, and tail deflections of 0 degrees and 15 degrees. The test Reynolds number used was 6.6 million per meter. Author

N79-27100*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

LEADING-EDGE SLAT OPTIMIZATION FOR MAXIMUM AIRFOIL LIFT

Lawrence E. Olson, Phillip R. McGowan (Computer Sci. Corp., Mountain View, Calif.), and Clayton J. Guest (Computer Sci. Corp., Mountain View, Calif.) Jul. 1979 28 p refs
(NASA-TM-78566; A-7753) Avail: NTIS HC A03/MF A01 CSCL 01A

A numerical procedure for determining the position (horizontal location, vertical location, and deflection) of a leading edge slat that maximizes the lift of multielement airfoils is presented. The structure of the flow field is calculated by iteratively coupling potential flow and boundary layer analysis. This aerodynamic calculation is combined with a constrained function minimization analysis to determine the position of a leading edge slat so that the suction peak on the nose of the main airfoil is minized. The slat position is constrained by the numerical procedure to ensure an attached boundary layer on the upper surface of the slat and to ensure negligible interaction between the slat wake and the boundary layer on the upper surface of the main airfoil. The highest angle attack at which this optimized slat position can maintain attached flow on the main airfoil defines the optimum slat position for maximum lift. The design method is demonstrated for an airfoil equipped with a leading-edge slat and a trailing edge, single-slotted flap. The theoretical results are compared with experimental data, obtained in the Ames 40 by 80 Foot Wind Tunnel, to verify experimentally the predicted slat position for maximum lift. The experimentally optimized slat position is in good agreement with the theoretical prediction, indicating that the theoretical procedure is a feasible design method. Author

N79-27101# Flow Research, Inc., Kent, Wash.

NUMERICAL EVALUATION OF TRANSONIC EQUIVALENCE RULE

M. M. Hafez Sep. 1978 56 p refs
(Contract N00014-76-C-0880)
(AD-A067902; FLOW-RR-127) Avail: NTIS HC A04/MF A01 CSCL 20/4

A numerical investigation was conducted to explore the applicability of the transonic equivalence rule. It is shown that for wings of small leading edge sweep angle, departure from Whitcomb-Oswatitsch area rule is significant. For sufficiently large or moderate leading edge sweep-angle, however, the agreement is satisfactory. Drag-rise and outer flow field calculations are presented for a number of cases and their equivalent bodies. Nonlinear lift corrections to the classical area rule are examined. There seems to be a surprisingly good agreement between calculated flows around equivalent wing-body combinations with the same wing planform for cases with appreciable lift.
Author (GRA)

N79-27102# ARO, Inc., Arnold Air Force Station, Tenn.

CALCULATION OF SKIN FRICTION IN TWO-DIMENSIONAL TRANSONIC, TURBULENT FLOW Final Report, Oct. 1977 - Sep. 1978

T. W. Swafford AEDC Apr. 1979 50 p refs
(AD-A067423; AEDC-TR-79-12) Avail: NTIS HC A03/MF A01 CSCL 20/4

An investigation of five computer programs which calculate skin friction and boundary-layer integral properties in two-dimensional, turbulent, transonic flow was conducted. The five programs were of varying complexity and consisted of four boundary-layer-type methods with turbulence modeling varying from algebraic eddy viscosity models to a two-equation of turbulence model, and one mean flow compressible Navier-Stokes technique with algebraic turbulence modeling. The quality of the computed results was judged by comparison with available experimental data. For the data considered (which were nonseparated, two-dimensional, transonic, adiabatic wall data), the most accurate calculations of skin friction were provided by an integral boundary-layer method and a finite difference boundary-layer method, both with algebraic turbulence modeling. GRA

N79-27103# Technische Univ., Berlin (West Germany). Inst. fuer Luft und Raumfahrt.

LEE SIDE FLOW FIELD OVER SLENDER DELTA WINGS OF FINITE THICKNESS [LEESEITEN-STROEMUNG BEI SCHLANKEN DELTAFLUEGELN ENDLICHER DICKE]

Joachim Czodruch 1977 150 p refs In GERMAN; ENGLISH summary
(ILR-23; ISBN-3-7983-0597-8) Avail: NTIS HC A07/MF A01

An experimental and theoretical investigation was carried out to determine the lee side flow field over delta wings at supersonic speeds. The experiments were performed with models of the same slenderness s/l = 0.3, but of different cross-section shape. The known types of flow, separated by the Stanbrook-Squire boundary into leading edge and shock induced separation were been verified. However, further types of flow exist and a detailed survey of the boundaries is necessary. The influence of the cross sectional shape on the lee side flow is discussed for the thick wing inside the region of shock induced separation. Parameters such as wedge angle at the center line, angle between upper and lower surface, and the lower side shape are considered. A theoretical method to describe the flow field is outlined where boundary conditions as a result of the experimental study are needed. The computed flow field with shock induced separation is satisfactory. Author (ESA)

N79-27104# Karlsruhe Univ. (West Germany). Rechenzentrum-Forschungsbereich Numerische Stroemungsmechanik.

EFFECTIVE DIFFERENCE METHOD FOR SOLVING NON-STATIONARY TWO DIMENSIONAL HYPERSONIC FLOW BOUNDARY LAYER PROBLEMS UNDER CHEMICAL NONEQUILIBRIUM CONDITIONS [EFFEKTIVE DIF-

FERENZENVERFAHREN ZUR LOESUNG DER INSTATIONAEREN ZWEIDIMENSIOWALEN HYPERSCHALLGRENZSCHICHTGLEICHUNGEN FUER CHEMISCHES NICHTGLEICHGEWICHT]

H. G. Daeubler, G. Glotz, and W. Schoenauer Jan. 1977 70 p refs In GERMAN; ENGLISH summary
(KU-RZ-9/1977) Avail: NTIS HC A04/MF A01

A self-adaptive difference method, developed to calculate stationary hypersonic boundary layers, was extended to nonstationary flow. Analogous to the streamwise direction, step sizes and orders of the method in time direction were evaluated in such a way that a prescribed error of the solution was not exceeded. Calculations were carried out on the AGARD hyperboloid, air being idealized as a binary mixture. Nonstationary effects appeared to be negligible for real reentry cases, whereas they have to be taken into consideration for short-time processes (i.e. in shock tubes). Author (ESA)

N79-27106# Karlsruhe Univ. (West Germany). Forschungsbereich Numerische Stroemungs-Mechanik am Rechenzentrum.

THE INFLUENCE OF ERROR INTRODUCED BY THERMAL STABLE THERMODYNAMIC AND KINETIC REACTION VARIABLES ON THE SOLUTION OF EQUATIONS FOR TWO-DIMENSIONAL LAMINAR HYPERSONIC BOUNDARY LAYERS Ph.D. Thesis [DER EINFLUSS VON FEHLERN BEI DEN ANPASSPARAMETERN DER THERMOSTATIK THERMODYNAMIK UND DER REAKTIONSKINETIK AUF DIE LOESUNG DER GLEICHUNGEN FUER ZWEIDIMENSIONALE LAMINARE HYPERSCHALLGRENZSCHICHT]

H. G. Daeubler 27 Jun. 1977 119 p refs In GERMAN; ENGLISH summary
(KU-RZ-10/1977) Avail: NTIS HC A06/MF A01

Real gas flows were numerically described, passing different steps of idealization, in order to map the physical model onto a system of equations. It was found that the idealization of the molecular parameters of the thermodynamic properties, transport coefficients, and chemical reaction rates introduces considerable error into the computations which limits the overall accuracy of the solution. A sensitivity analysis of these errors was performed and an estimate of the influence of these errors, resulted in a reasonable value of numeric accuracy. Author (ESA)

N79-27108# Karlsruhe Univ. (West Germany). Forschungsbereich Numerische Stroemungsmechanik am Rechenzentrum.

INFLUENCE OF CHEMICAL REACTIONS AND OTHER PARAMETERS ON THE HYPERSONIC BOUNDARY LAYER IN AIR [EINFLUSS DES CHEMIEMODELLS UND RANDBEDINGUNGEN AUF DIE HYPERSCHALLGRENZSICHT BEI LUFT]

G. Glotz and W. Schoenauer Aug. 1977 302 p refs In GERMAN; ENGLISH summary
(KU-RZ-12/1977) Avail: NTIS HC A16/MF A01

Studies are described which evaluate the influence of several parameters on the solution of the laminar hypersonic boundary layer. The number of elements, components, and chemical reactions was varied, as was the influence of chemical nonequilibrium and boundary conditions at the wall. The boundary layer was calculated past a blunt reentry body the AGARD hyperboloid, for six different flight conditions corresponding to an assumed reentry trajectory. Results are presented and discussed extensively, and all formulas used in the computer program are presented in detail. Author (ESA)

N79-27107# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Flugtechnik.

WIND TUNNEL MEASUREMENTS OF DYNAMIC DERIVATIVES IN THE GERMAN FEDERAL REPUBLIC [WINDKANALMESSUNG DYNAMISCHER DERIVATIVA IN DER BUNDES REPUBLIK DEUTSCHLAND]

Xaver Hafer, Otto Determann, and Juergen Oser 2 May 1978 31 p refs In GERMAN Sponsored by Deut. Forschungsgemeinschaft
(IFD-5-78) Avail: NTIS HC A03/MF A01

The oscillatory and rotary derivative balances employed are described. Test results obtained with identical models in different wind tunnels using different dynamic balances are compared. Results obtained with a simple standard test appear to be sufficiently accurate and reproducible. Furthermore, agreement between wind tunnel and flight measurements is good. Emphasis is given to the significance of simple dynamic derivatives for the dynamic behavior of various aircraft. Author (ESA)

N79-27108# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).

INVESTIGATION OF WALL PRESSURE FIELDS BENEATH TURBULENT BOUNDARY LAYERS Thesis - Goettingen Univ., West Ger. [UNTERSUCHUNG VON WANDDRUCKFELDERN UNTER TURBULENTEN GRENZSCHICHTEN]

Michael Hessel Jul. 1978 83 p refs In GERMAN
(MPIS-11/1978) Avail: NTIS HC A05/MF A01, Max-Planck Inst. fuer Stroemungsforsch., Goettingen, West Ger. DM 27,15

Instantaneous images of this phenomenon were previously obtained by Emmerling, Meier and Dinkelacker using a special optical method; some 208 frames of this film were studied. The spatial and temporal evolutions of large and small pressure zones were determined from these observations together with the corresponding parameters (convection, velocity expansion, etc.). The results are compared with those obtained with a mathematical model. Author (ESA)

N79-27109# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.

INVESTIGATIONS OF INTERFERENCE EFFECTS IN A WIND TUNNEL CAUSED BY A MODEL SUPPORT STRUT ON A REFLECTION PLANE MOUNTED HALF MODEL M.S. Thesis - Roy. Inst. of Technol., Stockholm

Olle Lindau and Bertil Braennstroem 1978 95 p refs
(Contract FMV-FK-82223-76-002-21-001)
(FFA-TN-AU-1335:2) Avail: NTIS HC A05/MF A01

A theoretical and experimental investigation of the interference effects in a wind tunnel, caused by the support strut for complete models, on the flow around a reflection-plane mounted half model was made. The theoretical part consisted of a computer simulation of the flow around a half model in the wind tunnel with and without the support strut. The experimental part consisted of wind tunnel tests with a 1:25 scale model in the 0.5 x 0.5 sq m transonic wind tunnel S5 at Mach numbers from 0.5 to 0.975. Three different struts were investigated. The theoretical estimates of the interference loads at small incidence agree well with the measured values. The effects are in general small except at higher angles of attack where the effects increase. This is especially noticeable in the pitching moment, resulting in the earlier occurrance of the pitch-up. Author (ESA)

N79-27110# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.

CALCULATION OF PRESSURE DISTRIBUTION FOR A WING-BODY COMBINATION AT SUBSONIC MACH NUMBERS Final Report

Sven Hedman 1978 49 p refs
(Contract FMV-FK-82223-73-009-730906)
(FFA-TN-AU-1091) Avail: NTIS HC A03/MF A01

Calculation of pressure distribution on a simple wing-body combination was performed at subsonic Mach numbers 0.1, 0.5, 0.7 and 0.8 for 0 deg and 5.73 deg angles of attack with a method derived from the Woodward panel method. These results were compared with two other computational methods, one being a surface panel method and the other a method based on Truckenbrodt lifting surface theory. Comparisons between the three computational procedures show good agreement.
Author (ESA)

N79-27111# Atomic Weapons Research Establishment, Aldermaston (England).

ZERO AND SUPERPRESSURE FREE FLIGHT BALLOONING

R. J. Burgess London Dec. 1978 27 p
(AWRE-0-61/78; BR66164; ISBN-0-85518127-3) Avail: NTIS HC A03/MF A01; HMSO £ 1

Techniques for successful balloon flying which have been developed over the years are discussed. Two types of free flying balloon are considered, each having a different function. These are zero pressure balloons capable of carrying yp to 250 kg to 5 mb (118,000 ft) and remaining at altitude for a maximum of 10 h., whose payload is recoverable, and superpressure balloons

capable of carrying a much lighter payload (less than 10 kg) to 10 mb (100,000 ft) with a possible flight time of many weeks, but whose payload is not normally recoverable. Author (ESA)

N79-27084*# Army Research and Technology Labs., Moffett Field, Calif. Aeromechanics Lab.
WIND TUNNEL TESTS OF FOUR FLEXIBLE WING ULTRA-LIGHT GLIDERS
Robert A. Ormiston *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 557-589 (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01A

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N79-27112*# Douglas Aircraft Co., Inc., Long Beach, Calif.
CARGO LOGISTICS AIRLIFT SYSTEMS STUDY (CLASS). VOLUME 3: CROSS IMPACT BETWEEN THE 1990 MARKET AND THE AIR PHYSICAL DISTRIBUTION SYSTEMS, BOOK 1
R. J. Burby and W. H. Kuhlman Oct. 1978 383 p
(Contract NAS1-14948)
(NASA-CR-158914) Avail: NTIS HC A17/MF A01 CSCL 01C

The interrelations between the infrastructure and the forecast future market are discussed. Also, using forecasts of market growth for a base, future aircraft and air service concepts were evaluated. For individual titles, see N79-27113 through N79-27115.

N79-27113*# Douglas Aircraft Co., Inc., Long Beach, Calif.
THE 1990 SYSTEM CHARACTERISTICS AND REQUIREMENTS
In its Cargo Logistics Airlift Systems Study (CLASS), Vol. 3 Oct. 1978 p 1-64 (For primary document see N79-27112 18-03)
Avail: NTIS HC A17/MF A01 CSCL 01C

Potential future developments that may occur in the air, truck, rail, and sea transportation industries were identified. Technological and operational developments were qualitatively evaluated for their potential effect upon the vehicle and institutional characteristics of the respective modes. Also identified were the multiplicity of cross impacts that must be considered when viewing air cargo as an integrated transport system. R.E.S.

N79-27114*# Douglas Aircraft Co., Inc., Long Beach, Calif.
AIRFREIGHT FORECASTING METHODOLOGY AND RESULTS
In its Cargo Logistics Airlift Systems Study (CLASS), Vol. 3 Oct. 1978 p 65-132 (For primary document see N79-27112 18-03)
Avail: NTIS HC A17/MF A01 CSCL 01C

A series of econometric behavioral equations was developed to explain and forecast the evolution of airfreight traffic demand for the total U.S. domestic airfreight system, the total U.S. international airfreight system, and the total scheduled international cargo traffic carried by the top 44 foreign airlines. The basic explanatory variables used in these macromodels were the real gross national products of the countries involved and a measure of relative transportation costs. The results of the econometric analysis reveal that the models explain more than 99 percent of the historical evolution of freight traffic. The long term traffic forecasts generated with these models are based on scenarios of the likely economic outlook in the United States and 31 major foreign countries. R.E.S.

N79-27115*# Douglas Aircraft Co., Inc., Long Beach, Calif.
THE 1990 DIRECT SUPPORT INFRASTRUCTURE
In its Cargo Logistics Airlift Systems Study (CLASS), Vol. 3 Oct. 1978 p 133-351 (For primary document see N79-27112 18-03)
Avail: NTIS HC A17/MF A01 CSCL 01C

The airport and cargo terminal were individually analyzed in depth as the principal direct infrastructure components having cross impacts with aircraft carrying cargo. Containerization was also addressed in depth as an infrastructure component since it categorically is linked with and cross impacted by the aircraft, the cargo terminal, the surface transport system, the shipper and consignee, and the actual cargo being moved. R.E.S.

N79-27116# Lockheed-California Co., Burbank.
SUMMARY OF RESULTS FOR A TWIN-ENGINE, LOW-WING AIRPLANE SUBSTRUCTURE CRASH IMPACT CONDITION ANALYZED WITH PROGRAM KRASH Final Report, Jul. 1978 - Jan. 1979
G. L. Wittlin Jan. 1979 122 p refs
(Contract DOT-FA75WA-3707)
(AD-A069171; LR-28869; FAA-RD-79-13) Avail: NTIS HC A06/MF A01 CSCL 01/3

The results of using digital computer program KRASH to model and analyze the dynamic response of a twin-engine, low-wing airplane substructure subjected to a 27.5 ft/sec vertical velocity impact are reported. The test was performed previously by NASA-Langley as part of a joint FAA-NASA effort concerning general aviation airplane crash dynamics. A mathematical model description, pertinent test data, a comparison of analysis versus test results and the results of a limited parameter sensitivity using program KRASH are included. Floor and occupant pelvis vertical acceleration responses obtained from test measurement are compared to corresponding analytical results. The effect of model representation and input data selection variations on dynamic behavior are evaluated. S.E.S.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N79-27117# Mitre Corp., McLean, Va.
DEFINITION, DESCRIPTION, AND INTERFACES OF THE FAA'S DEVELOPMENTAL PROGRAMS. VOLUME 1: OVERVIEW Final Report
F. S. Keblawi Sep. 1978 146 p
(Contract DOT-FA79WA-4184)
(AD-A068226; FAA-EM-78-16; MTR-7904-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 17/7

An overview is presented of the evolution of the air traffic control system facilities as major system improvements currently being developed by the FAA are implemented. The description was prepared to assist the FAA with the technical planning for the future air traffic control system. The major domestic air traffic control facilitity classifications are described. R.E.S.

N79-27118# Mitre Corp., McLean, Va. Metrek Div.
DEFINITION, DESCRIPTION, AND INTERFACES OF THE FAA'S DEVELOPMENTAL PROGRAMS. VOLUME 2: ATC FACILITIES AND INTERFACES Final Report
P. O. Dodge, T. R. Simpson, W. F. Potter, G. G. Beeker, H. P. Guerber, J. C. Fowlkes, and F. S. Keblawi Sep. 1978 436 p refs
(Contract DOT-FA79WA-4184)
(AD-A068401; MTR-7904-Vol-2; FAA-EM-78-16-2-Vol-2)
Avail: NTIS HC A19/MF A01 CSCL 17/7

The evolution of the air traffic control system facilities is described. Major system improvements currently being developed by the FAA are also described. Information flow between facilities is emphasized. R.E.S.

N79-27119# Lincoln Lab., Mass. Inst. of Tech., Lexington.
DISCRETE ADDRESS BEACON SYSTEM (DABS) AIR TRAFFIC CONTROL RADAR BEACON SYSTEM (ATCRBS) INTERFERENCE ANALYSIS Final Report
J. D. Welch and W. H. Harman 27 Nov. 1978 87 p refs Prepared for DOT
(Contract DOT-FA72WAI-261; F19628-78-C-0002)
(AD-A068565; FAA-RD-78-147) Avail: NTIS HC A05/MF A01 CSCL 17/7

The Discrete Address Beacon System (DABS) of the Air Traffic Control Radar Beacon System (ATCRBS) is provided to improve the surveillance and data link service to suitably equipped aircraft operating on the same ATCRBS frequencies. The assumptions, models, and system operation necessary to assess the potential interference effects of DABS on ATCRBS are presented. S.E.S.

N79-27120# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE DABS CALIBRATION PERFORMANCE MONITORING EQUIPMENT
J. C. Anderson 23 Mar. 1979 53 p
(Contracts DOT-FA72WAI-261; F19628-78-C-0002)
(AD-A069126; ATC-89; FAA-RD-78-151) Avail: NTIS HC A04/MF A01 CSCL 17/1

The Discrete Address Beacon System (DABS) Calibration Performance Monitor Equipment (CPME) is a special DABS transponder designed for installation at a fixed site visible to one or more DABS beacon sensors. The CPME is required for DABS sensor monopulse accuracy tests and for calibration of the sensor off-boresite azimuth look-up table. The CPME provided tests for DABS link integrity, by storing an uplink message and parroting it back upon command from the sensor. All information necessary to obtain a general understanding of the CPME system and its operation is presented. S.E.S.

N79-27121# Ludwig-Maximilians-Universitaet, Munich (West Germany). Inst. of Astronomical and Physical Geodesy.
GEODETIC APPLICATIONS OF INERTIAL NAVIGATIONAL SYSTEMS Final Report
Erik W. Grafarend Mar. 1979 122 p refs
(Grant DA-ERO-77-G-056)
(AD-A067179) Avail: NTIS HC A06/MF A01 CSCL 17/7

A gradiometer-aided inertial navigation system is theoretically and statistically analyzed to estimate its abilities to monitor geocentric Cartesian coordinates. Having discussed the inertial instrumental units used on the moving platform and several reference coordinate frames applicable in all navigation systems, studies on the severe problem of the separability of the gravity gradients from the inertial disturbances are carried out. Simulation I presents how well the aided navigation system can produce inertial coordinates and how the newcomers of the inertial instrumentation, the gradiometers, perform on-board the moving vehicle. Quantization error studies are also analyzed and presented for such a system. Simulation II includes, besides the detailed analysis of the accelerometer and gradiometer error models used, the abilities of the system to estimate geocentric coordinates. Multipoint statistical analysis for the approximated inertial acceleration components shows that the navigation system under consideration behaves better as closer the reality is approached. Author (GRA)

N79-27122# Research Inst. of National Defence, Stockholm (Sweden).
NAVIGATION AND POSITION DETERMINATION [NAVIGERING OCH POSITIONSBESTAEMNING]
Sylve Arnzen Apr. 1978 64 p refs In SWEDISH
(FOA-A-20026-E3) Avail: NTIS HC A04/MF A01

The main features are summarized of currently available positioning systems used for the determination of geodetic references in connection with surface-marine and submarine activities. Radio navigation systems are described in detail. Several positioning systems are dscribed briefly, including optical, mechanical and radar systems. The basic principles and limitations of several types of radio navigation are also described. The function, frequency, range of operation, approximate accuracy and testing procedures as well as technical and operational details and applications are covered. Brief mention is made of the current trend toward computerized hybrid positioning systems consisting of autonomous and nonautonomous subsystems. F.O.S.

N79-27123# Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).
THE ERROR DISTRIBUTION FOR MONOPULSE DIRECTION FINDING INVOLVING SEVERAL SOURCES
Ulrich Nickel Apr. 1978 46 p refs In GERMAN; ENGLISH summary
(FFM-267) Avail: NTIS HC A03/MF A01

The distance between the direction of the phase center of several sources and the center of gravity of these sources was investigated. Under the assumption that monopulse position-finding takes place in the farfield of two sources and without error, the probability density of this linear glint error was found for several models of fluctuations of amplitude and phase of the sources. Results show that these densities are also valid for the angular glint error in the farfield of the two sources. It is pointed out how the densities change if three instead of two sources are considered. Author (ESA)

N79-27124# Fondazione Ugo Bordoni, Rome (Italy).
THEORY AND EXPERIMENTS ON PRECISION L-BAND DME
Franco Chiarini (FACE Standard, Pomezia, Italy), Gabriele Falciasecca (Bologne Univ.), and Danio Graziani (FACE Standard, Milan) Dec. 1977 25 p refs
(FUB-44-1977) Avail: NTIS HC A02/MF A01

A preliminary report is given on studies and experiments conducted on the problems of increasing the accuracy of existing DME systems for use with microwave landing systems (MLS). Studies made on multipath errors suggested the use of a computer model which includes the area, the airport, and the receiver model. A mathematical expression of the receiver model is given. Improvement in accuracy can be obtained if the processing of many measurements is adapted to estimating the aircraft position. This procedure, however, was proved to reduce only the errors due to the electronic equipment. An example of a simple data processing procedure is given. The relationship between shape and frequency spectrum of a pulse was anlayzed. A pulse synthesizer built to facilitate the generation of special pulse shapes is described. Results of these investigations are given. Author (ESA)

N79-27073*# Liege Univ. (Belgium).
ON GLOBAL OPTIMAL SAILPLANE FLIGHT STRATEGY
Guy J. Sander and Francois-Xavier Litt *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 355-375 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 17G

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N79-27125*# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
THE INFLUENCE OF FEEDBACK ON THE AEROELASTIC BEHAVIOR OF TILT PROPROTOR AIRCRAFT INCLUDING THE EFFECTS OF FUSELAGE MOTION Final Technical Report, 1 Sep. 1976 - 31 Jan. 1978
H. C. Curtiss, Jr., T. Komatsuzaki, and J. J. Traybar Jul. 1979 176 p refs
(Grant NsG-2181)
(NASA-CR-158778; TR-1441) Avail: NTIS HC A09/MF A01 CSCL 01C

The influence of single loop feedbacks to improve the stability of the system are considered. Reduced order dynamic models are employed where appropriate to promote physical insight. The influence of fuselage freedom on the aeroelastic stability, and the influence of the airframe flexibility on the low frequency

modes of motion relevant to the stability and control characteristics of the vehicle were examined. S.E.S.

N79-27126*# Northrop Corp., Hawthorne, Calif.
YF-17/ADEN SYSTEM STUDY Final Report
N. S. Gowadia, W. D. Bard, and W. H. Wooten (General Electric Co.) Jul. 1979 160 p refs
(Contract NAS4-2499)
(NASA-CR-144882) Avail: NTIS HC A08/MF A01 CSCL 01C

The YF-17 aircraft was evaluated as a candidate nonaxisymmetric nozzle flight demonstrator. Configuration design modifications, control system design, flight performance assessment, and program plan and cost we are summarized. Two aircraft configurations were studied. The first was modified as required to install only the augmented deflector exhaust nozzle (ADEN). The second one added a canard installation to take advantage of the full (up to 20 deg) nozzle vectoring capability. Results indicate that: (1) the program is feasible and can be accomplished at reasonable cost and low risk; (2) installation of ADEN increases the aircraft weight by 600 kg (1325 lb); (3) the control system can be modified to accomplish direct lift, pointing capability, variable static margin and deceleration modes of operation; (4) unvectored thrust-minus-drag is similar to the baseline YF-17; and (5) vectoring does not improve maneuvering performance. However, some potential benefits in direct lift, aircraft pointing, handling at low dynamic pressure and takeoff/landing ground roll are available. A 27 month program with 12 months of flight test is envisioned, with the cost estimated to be $15.9 million for the canard equipped aircraft and $13.2 million for the version without canard. The feasiblity of adding a thrust reverser to the YF-17/ADEN was investigated. S.E.S.

N79-27127# Pacer Systems, Inc., Arlington, Va.
REVIEW OF AIRWORTHINESS STANDARDS FOR CERTIFICATION OF HELICOPTERS FOR INSTRUMENT FLIGHT RULES (IFR) OPERATION Final Report, Apr. 1977 - Jun. 1978
J. J. Traybar, D. L. Green, and A. G. DeLucien Feb. 1979 245 p refs
(Contract DOT-FA77WA-3966)
(AD-A068397; PAR-007-79; FAA-RD-78-157) Avail: NTIS HC A11/MF A01 CSCL 01/3

A review of current technology, existing data applicable to Instrument Flight Rules (IFR)helicopter operation and certification procedures was accomplished. Identification of specific airworthiness requrements for helicopters operating in IFR conditions was studied and special attention was given to aircrew manning configurations, pilot flight control workloads, helicopter trim, static stability, dynamic stability, handling qualities, analysis of time history data and documentation procedures, augmentation systems, autopilots and a review of certain flight test techniques. An analysis was made of the numerous helicopters recently certified for IFR flight in order to establish the various systems uutilized including avionics systems, display systems and autopilot type systems. Special emphasis was centered on the study of the most critical IFR flight phases depicted by high workload cruise conditions and marginal stability conditions. Author

N79-27128# Grumman Aerospace Corp., Bethpage, N.Y. System Sciences.
THE COMPUTATION OF OPTIMAL AIRCRAFT TRAJECTORIES
H. G. Moyer Jul. 1979 65 p refs
(RE-577) Avail: NTIS HC A04/MF A01

An aircraft trajectory optimization computer program that was used successfully at Grumman for a variety of problems over a period of many years is described. Three airplanes are simulated: the F-14, F-15, and Advanced Tactical Fighter. The trajectories are in three dimensions over a flat earth. Optimization is achieved by means of the conjugate gradient variational technique. Inequality constraints on the path and equality constraints on the final point are satisfied by penalty integrals and penalty functions, respectively. The equality constraints can be satisfied to the limit of computer accuracy by a technique that avoids increases in the penalty function constants. M.M.M.

N79-27129# McDonnell Aircraft Co., St. Louis, Mo.
AIRCRAFT HYDRAULIC SYSTEMS DYNAMIC ANALYSIS Final Report, 18 Feb. 1977 - 30 Sep. 1978
H. DeGarcia, J. B. Greene, R. J. Levek, and N. J. Pierce Jan. 1978 356 p refs
(Contract F33615-74-C-2016; AF Proj. 3145)
(AD-A067549; AFAPL-TR-78-77) Avail: NTIS HC A15/MF A01 CSCL 13/7

This report describes the continued development and test verification of digital computer models used to simulate hydraulic systems under dynamic conditions. Frequency and transient models of a variable delivery vane pump and a fixed displacement piston-type hydraulic motor are included. Additional verification and development of the transient model for the piston-type hydraulic pump was accomplished. Verification and development of a computer program to describe the mechanical response of a hydraulic line to internal excitations from a hydraulic pump was begun. This effort was a continuation of the basic contract wherein four computer programs for hydraulic system dynamic analysis were developed. GRA

N79-27130# Army Aviation Research and Development Command, St. Louis, Mo.
RAM PROJECTIONS FOR AIRCRAFT ROTOR BLADES Final Report
Israel Nussbaum Apr. 1979 18 p
(AD-A068822; USAAVRADCOM-TR-79-16) Avail: NTIS HC A02/MF A01 CSCL 01/3

Data was collected and a comparative analysis was performed on the estimated Reliability and Maintainability (RAM) characteristics of the main rotor blades belonging to two groups of four Army aircraft systems each. The first group is composed of aircraft in the current Army inventory, while the second consists of developmental and PIP aircraft which will be using the new composite rotor blades. The study was initiated internally as a result of wide discrepancies observed among various aircraft programs in the assumptions, definitions and methodologies used in projecting rotor blade RAM characteristics. The need became apparent to develop and apply a set of factors and criteria that could be used to help achieve uniformity, consistency and validity in the RAM projections. GRA

N79-27131# Rockwell International Corp., El Segundo, Calif. Los Angeles Div.
AIRCRAFT TRANSPARENCY FAILURE AND LOGISTICAL COST ANALYSIS. VOLUME 1: PROGRAM SUMMARY Final Report, Jun. 1977 - Sep. 1978
S. S. Brown Dec. 1978 67 p refs
(Contract F33615-77-C-3060)
(AD-A068719; NA-78-604-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 01/3

The concern for increasing costs in the maintenance of transparency systems has prompted the Air Force Flight Dynamics Laboratory to sponsor this study contract. The objective of this study is to identify the high-cost, high-maintenance transparency components, identify cause of failures, and recommend corrective programs to reduce cost of ownership to the Air Force Logistics Command. The study involved the review of 20 selected aircraft in current Air Force inventory to establish an extensive data base relating to transparency maintenance activity and associated logistical support costs. During this study, a collection of detailed design characteristics, methods of construction, test and qualification, and costing information was assembled. From these data, the basis for design improvements were determined. The approach used in the identification of candidate improvements was to focus on the high-cost contributors to maintenance and repair. Trade studies were subsequently generated to determine the design improvements that resulted in reduced logistical costs. The study results are presented in this report. GRA

N79-27132# Naval Postgraduate School, Monterey, Calif.
MK 82 BOMB EJECTION SENSITIVITY TEST REPORT
Donald R. Barr and F. Russell Richards Feb. 1979 24 p
(AD-A068583; NPS55-79-02) Avail: NTIS HC A02/MF A01 CSCL 19/2

An analysis of the data obtained in the Bomb Ejection Sensitivity Tests, conducted at White Sands during the summer of 1978, is presented. Preliminary reduction of the data was

performed by the Marine Aviation Detachment at Point Mugu, California. It is concluded that rack position had significant effects on bomb impact means during these tests. The effects of bomb rack positions increases CEP about 50 percent over what could be expected if those effects were not present. (GRA)

N79-27133# Arinc Research Corp., Annapolis, Md.
F-16 RELIABILITY IMPROVEMENT WARRANTY. IMPLEMENTATION AND MANAGEMENT PLAN
Apr. 1979 95 p
(Contract F33657-78-C-0156)
(AD-A068561; Rept-1713-01-5-1902) Avail: NTIS HC A05/MF A01 CSCL 15/5

The purpose of the Implementation and Management Plan is to provide a complete and comprehensive document that describes the multiple features of the F-16 RIW program, defines the responsibilities for meeting the contractual provisions of the program, identifies the responsible participants, and establishes the procedures and interfaces required for its successful implementation and management. The objective of the IMP is to assist the MFP users in introducing the F-16 RIW items into their inventories with minimum disruption to existing logistic support procedures. GRA

N79-27134# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Flugtechnik.
AERONAUTICAL RESEARCH INTO VERTICAL PROBLEMS IN V/STOL AIRCRAFT APPROACH LANDING Final Report [FLUGMECHANISCHE UNTERSUCHUNG ZUM PROBLEM STEILER LANDEANFLUEGE FUER V/STOL-FLUGZEUGE]
Volker Nitsche 18 Aug. 1978 157 p refs In GERMAN Sponsored by Deut. Forschungsgemeinschaft
(IFD-4-78) Avail: NTIS HC A08/MF A01

Take-off and landing behavior of two typical VTOL aircraft (jet and propeller driven) were investigated from the noise point of view. Various factors (thrust, thrust angle, flap shutter position, transition angles, etc.) influence noise. A digital computer simulation program was used to define a noise protected zone. Certain criteria must be satisfied, such as minimum fuel consumption, minimum take-off time, and minmum noise. In all cases, other then the landing of VTOL propeller craft (where fuel consumption is minimum and noise optimum), increasing excess take-off thrust enlarges the noise protected zone. Air temperature and humidity must be taken into account if reliable results are to be obtained. Author (ESA)

N79-27135# National Aerospace Lab., Amsterdam (Netherlands). Div. of Structure and Materials.
THE REQUIREMENT OF DAMAGE TOLERANCE. AN ANALYSIS OF DAMAGE TOLERANCE REQUIREMENTS WITH SPECIFIC REFERENCE TO MIL-A-83444
J. B. deJonge 16 Jan. 1978 33 p refs Sponsored by the Dept. of Civil Aviation (RLA)
(NLR-TR-77005-U) Avail: NTIS HC A03/MF A01

Various aspects of damage tolerance are discussed with specific reference to a recently issued USAF detailed damage tolerance specification. Main criteria stipulate that if a crack occurs the aircraft structure should be able to sustain a reasonably high load in cracked condition. It is concluded that USAF specifications will stimulate the development of improved manufacturing techniques, although it will tend to favor non-inspectable slow-crack propagation structures rather than easily inspectable fail-safe structures. It is also felt that USAF requirements are not well suited to civil needs. Author (ESA)

N79-27071*# Iowa State Univ. of Science and Technology, Ames.
MINIMUM ALTITUDE-LOSS SOARING IN A SPECIFIED VERTICAL WIND DISTRIBUTION
Bion L. Pierson and Imao Chen *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 305-318 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

N79-27072*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A STUDY OF COURSE DEVIATIONS DURING CROSS-COUNTRY SOARING
Steven M. Sliwa and David J. Sliwa (Ill. Univ. at Urbana-Champaign) *In its* Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 319-353 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

N79-27076*# Stuttgart Univ. (West Germany). Inst. A for Mechanics.
A GENERAL METHOD FOR THE LAYOUT OF AILERONS AND ELEVATORS OF GLIDERS AND MOTORPLANES
Manfred H. Hiller *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 399-418 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

N79-27077*# Politecnico di Torino (Italy).
EXPERIMENTAL INVESTIGATION INTO THE FEASIBILITY OF AN EXTRUDED WING
Piero Morelli and Giulio Romeo *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 419-436 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

N79-27079*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany).
ADVANCED COMPOSITES IN SAILPLANE STRUCTURES: APPLICATION AND MECHANICAL PROPERTIES
Dieter Muser *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 467-483 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

N79-27080*# Boeing Commercial Airplane Co., Seattle, Wash.
THE ULTRALIGHT SAILPLANE
John H. McMasters *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 485-504 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

N79-27081*# Stanford Univ., Calif.
ANALYTICAL AND SCALE MODEL RESEARCH AIMED AT IMPROVED HANGGLIDER DESIGN
Ilan Kroo and Li-Shing Chang *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 505-521 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

N79-27082*# Instytut Lotnictwa, Warsaw (Poland).
IMPROVEMENT OF HANG GLIDER PERFORMANCE BY USE OF ULTRALIGHT ELASTIC WING
Jerzy S. Wolf *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 523-536 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

N79-27083*# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Aerospace Mechanics Div.
EXPERIMENTAL STUDY OF THE FLIGHT ENVELOPE AND RESEARCH OF SAFETY REQUIREMENTS FOR HANG-GLIDERS
Claudius LaBurthe *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 537-556 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N79-27136*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AN ADVANCED COCKPIT INSTRUMENTATION SYSTEM: THE COORDINATED COCKPIT DISPLAY
D. L. Baty and M. L. Watkins (San Jose State Univ.) Jul. 1979 22 p refs
(NASA-TM-78559; A-7733) Avail: NTIS HC A02/MF A01 CSCL 01D

Cathode Ray Tube (CRT) and computer technologies are described in one approach to the replacement of flight instruments using three separate color CRT's. Each CRT display information pertinent to one of the three orthogonal projections of the aircraft flight situation. Three airline pilot's assessment of the display set is presented. Comments, rankings, and ratings show that the pilots accepted the concept of pictorial flight displays. S.E.S.

N79-27137# Naval Postgraduate School, Monterey, Calif.
APPLICATION OF COLOR-CODING IN AIRBORNE TACTICAL DISPLAYS M.S. Thesis
Hilton L. Conner, Jr. Mar. 1979 96 p refs
(AD-A067558) Avail: NTIS HC A05/MF A01 CSCL 15/1

This thesis analyzes the operational environment and task variables of the Tactical Coordinator in the S-3A for possible application of color coding in the display symbology in the multi-Purpose display. Beginning with the ASW threat to the carrier force under the CV concept, the missions of the S-3A are presented. The roles, tasks and functions of the Tactical Coordinator are identified and form the basis for an analysis of the need of color in airborne displays. Current display design requirements and discrepancies in the S-3A are discussed as a basis for areas of color application. Color research recently conducted is reviewed with the results directed toward the symbology currently used in airborne displays. Author (GRA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N79-27138*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AERODYNAMICS OF A TILT-NACELLE V/STOL PROPULSION SYSTEM
Mark D. Betzina and Michael D. Falarski Jun. 1979 18 p refs Presented at Workshop of V/STOL Aerodynamics, Monterey, Calif., May 1979
(NASA-TM-78606; A-7849) Avail: NTIS HC A02/MF A01 CSCL 21E

Tests were performed in the Ames 40 by 80 Foot Wind Tunnel on a large-scale, tilt-nacelle V/STOL propulsion system to determine its aerodynamic characteristics. Unpowered nacelle aerodynamics and power induced effects over an angle of attack range from 0 to 105 deg are presented. It is shown that: (1) the characteristics of the unpowered nacelle can be estimated with annular airfoil data, (2) the power-induced effects on the nacelle aerodynamics are significant, and (3) pitching moment can be correlated with lift and thrust. S.E.S.

N79-27139# Rolls-Royce Ltd., Derby (England).
ENGINE PERFORMANCE CONSIDERATIONS FOR THE LARGE SUBSONIC TRANSPORT
B. Wrigley 1969 28 p Lecture given at the Von Karman Inst., Brussels, 23 Apr. 1969
Avail: NTIS HC A03/MF A01

The importance of the design point parameters for a subsonic aircraft and the factors influencing off design performance, including computer matching are presented. Noise reducing features, such as the single fan stage was examined. M.M.M.

N79-27140*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TURBINE ENGINE ALTITUDE CHAMBER AND FLIGHT TESTING WITH LIQUID HYDROGEN
E. William Conrad 1979 22 p refs Presented at the Intern. DGLR/DFVLR Symp. on Hydrogen in Air Transportation, Stuttgart, 11-14 Sep. 1979
(NASA-TM-79196; E-062) Avail: NTIS HC A02/MF A01 CSCL 21E

Flight engine experiments using liquid hydrogen fuel were reviewed. A few implications of the results to modern turbine engines are presented. A subsequent contract dealing with a positive displacement pump operating on liquid hydrogen is discussed, and some aspects of liquid hydrogen propellant systems, reflected by rocket booster experience are treated. S.E.S.

N79-27141*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ENERGY EFFICIENT AIRCRAFT ENGINES
Roger Chamberlin and Brent Miller 1979 21 p refs Presented at Aircraft Systems Meeting, New York, 20-22 Aug. 1979; sponsored by AIAA
(NASA-TM-79204; E-089) Avail: NTIS HC A02/MF A01 CSCL 21E

The three engine programs that constitute the propulsion portion of NASA's Aircraft Energy Efficiency Program are described, their status indicated, and anticipated improvements in SFC discussed. The three engine programs are (1) Engine Component Improvement--directed at current engines, (2) Energy Efficiency Engine directed at new turbofan engines, and (3) Advanced Turboprops--directed at technology for advanced turboprop--powered aircraft with cruise speeds to Mach 0.8. Unique propulsion system interactive ties to the airframe resulting from engine design features to reduce fuel consumption are discussed. Emphasis is placed on the advanced turboprop since it offers the largest poetntial fuel savings of the three propulsion programs and also has the strongest interactive ties to the airframe. Author

N79-27142*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FLOW VISUALIZATION OF DISCRETE-HOLE FILM COOLING WITH SPANWISE INJECTION OVER A CYLINDER
Louis M. Russell Jul. 1979 15 p refs
(NASA-TP-1491; E-9946) Avail: NTIS HC A02/MF A01 CSCL 21E

Insight into the fluid mechanics encountered when film air from a single row of holes is injected over a cylinder in a mainstream at conditions simulating a film cooled, turbulent-vane leading edge was investigated. Smoke was added to the cooling air to visualize its flow path. Film was injected in the spanwise direction at angles of 30 deg and 45 deg to the surface; at angular locations of 15 deg, 30 deg, 45 deg, and 60 deg from the stagnation line; and at various blowing ratios. The observations were related to the measured heat transfer data of others. The results indicate that, in addition to the expected growth in film thickness and the greater penetration of the boundary layer with increasing blowing ration, there was an absence of spanwise spreading and only a small spanwise deflection of the injected film. S.E.S.

N79-27143*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF TWO-STAGE FAN HAVING LOW-ASPECT-RATIO FIRST-STAGE ROTOR BLADING
Donald C. Urasek, William T. Gorrell (Army Aviation Res. and Develop. Command, Cleveland), and Walter S. Cunnan Aug. 1979 132 p Prepared in cooperation with US Army Aviation Research and Development Command, Cleveland
(NASA-TP-1493; AVRADCOM-TR-78-49; E-9237) Avail: NTIS HC A07/MF A01 CSCL 21E

The NASA two stage fan was tested with a low aspect ratio first stage rotor having no midspan dampers. At design speed the fan achieved an adiabatic design efficiency of 0.846, and peak efficiencies for the first stage and rotor of 0.870 and 0.906, respectively. Peak efficiency occurred very close to the stall line. In an attempt to improve stall margin, the fan was retested with circumferentially grooved casing treatment and with

a series of stator blade resets. Results showed no improvement in stall margin with casing treatment but increased to 8 percent with stator blade reset. Author

N79-27144# Naval Postgraduate School, Monterey, Calif.
DESIGN OF SHOCK-FREE TRANSONIC FLOW IN TURBOMACHINERY Technical Report, 20 Jun. 1978 - 15 Aug. 1978
Helmut Sobieczky Nov. 1978 42 p refs
(AD-A067703; NPS67-78-005) Avail: NTIS HC A03/MF A01 CSCL 20/4

A new design method for transonic flow in turbomachinery is described. The idea is based on the author's previous experience with hodograph methods but carried out in physical space. If combined with a flow analysis code the new method can be used as a design/analysis tool. Results illustrating this procedure are given for two dimensional flow through cascades and past airfoils. Existing configurations can be made shock-free by computational modifications which are limited to that portion of the design shape which is wetted by supersonic flow.
Author (GRA)

N79-27145# AiResearch Mfg. Co., Phoenix, Ariz.
COMBUSTOR DESIGN CRITERIA VALIDATION. VOLUME 2: DEVELOPMENT TESTING OF TWO FULL-SCALE ANNULAR GAS TURBINE COMBUSTORS
H. C. Mongia, R. S. Reynolds, E. Coleman, and T. W. Bruce Mar. 1979 266 p
(Contract DAAJ02-75-C-0044; DA Proj. 1F2-62209-AH-76)
(AD-A067689; AiResearch-75-211682(38)-2; USARTL-TR-78-55B-Vol-2) Avail: NTIS HC A12/MF A01 CSCL 21/5

This report describes the development testing of two full-scale, reverse-flow, annular combustor systems that were designed based on the empirical/analytical design procedures described in Volume I. The baseline, Concept I, configuration met all design objectives with no hardware modifications. Concept II met the design objectives after only one major hardware modification design procedure for these two test concepts. The combustor-development time was significantly reduced, meeting the main objective of the USARTL Program. Volume III is the User's Manual for the models and includes a description of the models and a listing of the computer codes with instructions on usage.
Author (GRA)

N79-27146# AiResearch Mfg. Co., Phoenix, Ariz.
COMBUSTOR DESIGN CRITERIA VALIDATION. VOLUME 1: ELEMENT TESTS AND MODEL VALIDATION Final Report
T. W. Bruce, H. C. Mongia, and R. S. Reynolds Mar. 1979 390 p refs
(Contract DAAJ02-75-C-0044; DA Proj. 1F2-62209-AH-76)
(AD-A067657; AiResearch-75-211682(38)-1; USARTL-TR-78-55A) Avail: NTIS HC A17/MF A01 CSCL 21/5

This report describes the 37-month program for the development of analytical models applicable to small gas turbine combustors. Six analytical models were developed and validated with element tests. The inputs and correlations obtained from the element tests along with basic developments to the models and the numerics provided analytical models when used in judicious conjunction with traditional empirical design and development of two different advanced reverse flow annular combustor concepts. One concept met all program performance goals without any major design modifications and the second concept required only one modification to meet the objectives. Therefore, the analytical models, when used in the proper context in conjunction with empirical methodology will reduce the design and development time and cost associated with gas turbine combustion systems. In addition, the models add to the fundamental understanding of the physical processes occurring within the combustor which affect its performance. Extensive performance mapping of the two developed combustor concepts was conducted. This data was used to validate and update the computer models. This is Volume I of the three-volume final report covering the combustor element tests and model validation that took place in Task 1 of the program. Volume II reports the results of program Tasks II and III on the design, fabrication, and rig test of the two different combustors. Volume III is the User's Manual for the models. GRA

N79-27147# Societe Nationale d'Etude et de Construction de Moteurs d'Aviation, Corbeil (France). Lab. de la Direction Technique.
STUDY OF TWO HEAT RESISTANT NICKEL ALLOYS FOR TURBOMACHINE PLATES European Concerted Action. COST 50 - Materials for Gas Turbines, Project F 3/1. Final Report [ETUDE DE DEUX SUPERALLIAGES A BASE DE NICKEL POUR DISQUES DE TURBOMACHINES]
Eric Bachelet 27 Feb. 1978 56 p In FRENCH
(Rept-20-393) Avail: NTIS HC A03/MF A01

A comparison of two heat resistant nickel alloys, Inconel 718 and waspaloy, was made. Static and cyclic loads were applied to both alloys in order to obtain an estimation of their fatigue lives as determined by crack initiation. Crack propagation was investigated as a function of temperature. Results show that Inconel 718 has superior static and cyclic initiation characteristics up to 600 C. Beyond this temperature limit waspaloy performs better, especially over extended test periods. Author (ESA)

N79-27148# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
STRESSES, VIBRATIONS, STRUCTURAL INTEGRATION AND ENGINE INTEGRITY (INCLUDING AEROELASTICITY AND FLUTTER)
Apr. 1979 494 p refs In ENGLISH and FRENCH Presented at the Propulsion and Energetics Panel's 52d Meeting, Cleveland, Ohio, 23-28 Oct. 1978
(AGARD-CP-248; ISBN-92-835-0235-3) Avail: NTIS HC A21/MF A01

Experimental stress analysis, stress analysis techniques-life prediction, and engine structural integrity-vibration, containment are covered. Also, engine-airframe integration/compatibility and aeroelasticity and flutter are included. For individual titles, see N79-27149 through N79-27181.

N79-27149# Avco Lycoming Div., Stratford, Conn.
STRUCTURAL ANALYSIS OF A GAS TURBINE IMPELLER USING FINITE-ELEMENT AND HOLOGRAPHIC TECHNIQUES
Peter S. Kuo and Kenneth S. Collinge *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 15 p refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

A rigorous finite element structural analysis method is presented which, combined with the holographic technique, deals with the highly stressed, curved vanes and the vibration of the flexible circular backplate so that the magnitude and the pattern of static, dynamic, and thermal loadings can be improved. The method demonstrates a computerized procedure for the design of a modern centrifugal impeller. Holography used as a means for determining the dynamic behavior of the engine component offers an accurate experimental measurement of natural frequencies and modes. The interference fringe pattern representing the contours of equal surface displacement provides a permanent record for vibration amplitude evaluation. Comparison between the theoretical and the experimental results is made. J.M.S.

N79-27150# Institut National des Sciences Appliquees de Lyon, Villeurbanne (France). Lab. de Mechanique des Structures.
THE ANALYSIS OF ENGINE VIBRATIONS [ANALYSE DES VIBRATIONS DE MOTEUR]
Michel Lalanne, Philippe Trompette, Remy Henry, and Guy Ferraris *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 13 p refs In FRENCH (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

The control of the vibrations of a structure is generally achieved at some stage of the project by the theoretical determination of frequencies and modes. The principal elements of an aircraft engine, for practical purposes, can be classed in three categories: compressor, combustion chamber, and turbine. These elements are fixed, or in rotation and are then under the Coriolis effect, and at a supplementary stiffening introduced by centrifugal force.

The calculation of thick and thin blades, of axisymmetric systems in rotation, and of disk-blade assemblies is reviewed. Once the prototype of the engine is constructed, it can withstand troubling frequencies, and instead of making structural modifications designed to displace these frequencies, damping materials can be selected to provide sufficient reduction in the amplitude of the resonance. The calculation of these types of damped structures is outlined; the finite element method is used. The diverse types of calculations performed in the study of frequencies and modes, and in predicting the damping introduced by the addition of materials, are illustrated by applications to the motor elements. Transl. by A.R.H.

N79-27151# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.

AIRCRAFT ENGINE DESIGN USING EXPERIMENTAL STRESS ANALYSIS TECHNIQUES

Bernard L. Koff *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 12 p (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

A perspective of prominent experimental techniques used in current aircraft engine stress analyses is given. The verification of temperature, stress, steady state and dynamic deformation, pressure, and fatigue strength is addressed. Advancements in instrumentation are described, including: high-energy X-rays and high durability strain gages; computers and software to reduce vast amounts of data; increased photoelastic capabilities; and advancements for reproducing loading and environmental conditions in laboratory component tests. J.M.S.

N79-27152# Societe Nationale d'Etude et de Construction de Moteurs d'Aviation, Evry Cedex (France). Div. Metallurgie-Resistance.

THE CONTRIBUTION OF PHOTOELASTICITY MEASUREMENT TO THE STUDY OF TURBINE PARTS [CONTRIBUTION DE LA PHOTOELASTICIMETRIE A L'ETUDE DES PIECES DE TURBOMACHINES]

J. L. Guillo *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 19 p In FRENCH (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

In the study of machine parts, the principal domain of photoelastic analysis is the investigation and measurement of local stress concentrations. For industrial applications, the frozen stress method is used exclusively for analyzing three dimensional stress states. Methods used in preparing for and conducting frozen stress operations are described and the equipment use is illustrated. The method is applied to the study of the vital elements of a gas turbine, at the design and development stage. The diversity of the parts analyzed and the modes of influences applied are accounted for. Besides determining the maximum local stress in the parts, two avenues of research are given particular attention: the study of residual stress gradients which can account for the influence of scaling factor in the transposition to engine parts, (some results from fatigue tests on small test pieces are included), and the determination of the stress intensity factor which governs crack propagation under cyclic influences. Transl. by A.R.H.

N79-27153# Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).

A CONTRIBUTION ON THERMAL FATIGUE IN COOLED TURBINE BLADING

W. Peschel and R. Schreieck *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 10 p refs (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

Thermal fatigue, an important criterion for predicting the life of cooled turbine blading, is caused by thermal stresses which arise from local inhibition of thermal expansion and which are not amenable to direct measurement. In the case of turbine blading, temperature distribution in the mean section of the blade can readily be dealt with as a problem of heat conduction in a plane. For stress calculation, it is assumed that the cross section remains plane. Stresses in the sectional plane and normal stresses in the direction of blade span result, the latter being the dominant ones. For thermal fatigue test conditions, stress and strain profiles in the blade are calculated using measured and calculated temperature distributions. Non-elastic material behavior (creep) is taken into account. In the thermal fatigue tests, the pattern of damage vary with superimposed external stresses; this behavior is explained in the light of the calculated stress-strain cycles. J.M.S.

N79-27154# Societe Nationale d'Etude et de Construction de Moteurs d'Aviation, Villaroche (France).

FORECASTING ENGINE LIFE [PREVISION DE LA DUREE DE VIE DES MOTEURS]

D. Grandoulier *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 10 p In FRENCH (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

The compromise between light weight and endurance for aircraft gas turbine engines requires the precise prediction of the durability of the engine parts. Those parts whose rupture threatens the integrity of the engine must be rated to meet two criteria: the initiation of a crack must be avoided during the predicted life of the part, and a flaw not detected during a general inspection must not develop to a critical point before the next inspection. A turbine disk is used to present a method for predicting low cycle fatigue life and for showing the importance of knowing the behavior laws of materials. Transl. by A.R.H.

N79-27155# Liege Univ. (Belgium). Lab. d'Aeronautique.

STRESS INTERPRETATION IN THE FINITE ELEMENT METHOD

P. Beckers *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 10 p refs (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

The classical methods are compared based on the computation of local stresses at various points like the vertices of the elements or the Gaussian points. An alternative interpretation of the stresses can be based on the definition of energy conjugate stresses that have the nature of weighted average of the stresses. A third possibility is offered which is rather new. It is based on the definition of connecting forces that have a direct and simple interpretation in terms of surface tractions. The corresponding finite elements are named delinquent elements as they are, in fact, displacement elements which used some of the connection modes of stress equilibrium elements. It is shown that none of the three interpretation techniques is in itself completely satisfactory in every situation, but that the combined use of them allows a much better caption of the state of stress. J.M.S.

N79-27156# AiResearch Mfg. Co., Phoenix, Ariz.

THREE-DIMENSIONAL FINITE-ELEMENT TECHNIQUES FOR GAS TURBINE BLADE LIFE PREDICTION

M. R. Peterson, R. G. Alderson, R. J. Stockton, and D. J. Tree *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 14 p refs (For primary document see N79-27148 18-07)

(Contract F33615-74-C-2012)

Avail: NTIS HC A21/MF A01

The use of three dimensional finite element analyses in conjunction with test derived data to predict the vibratory fatigue life of turbine blades is described. Vibratory strain measurements are interpreted and extended using predicted strain distributions from the finite element analysis. The statistical nature of test data is considered. Also, some techniques employed in three dimensional finite element analyses to enhance their use for stress and vibration analysis are described. These techniques include a method for reduction of the size of the eigenvalue problem for vibration analysis by a transformation to generalized coordinates derived from static solutions. An example of the application of these methods to a turbine blade analysis is presented. Author

N79-27157# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

CALCULATION OF STRESS CONCENTRATIONS IN DISC ALVEOLES

Madeleine Chaudonneret *In* AGARD Stresses, Vibrations, Struct.

Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 13 p refs In FRENCH; ENGLISH summary (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

The presence of notches in a loaded structure, such as alveoles in a turbine disc, is the cause of stress concentrations leading to important elastic and plastic deformations; moreover, the turbine operating conditions involve temperatures high enough to provoke viscoplastic deformations. Such stress concentrations, and their evolution in time, are accounted for by the integral equation method. In elasticity, a comparision in proposed with the finite element method concerning a section of the turbine disc. An extension is undertaken of this method to solve viscoplasticity problems by a process of time-step linearization, the behavior of the material being represented by viscoplastic constitutive laws. This method is used in particular to study the viscoplastic behavior of a notched plate subjected to tensile tests, and the results obtained this way are compared with those provided by the tests, a comparison that shows a very good agreement.
Author

N79-27158# Fiat Aviazione S.p.A., Turin (Italy).
SOME THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF STRESSES AND VIBRATIONS IN A RADIAL FLOW ROTOR
A. Grasso, J. J. Blech, and G. Martinelli *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

The problem of an integrally bladed radial compressor under the influence of a centrifugal force is considered. Two calculation methods based also on finite element method are proposed. The first adopts a mixed three dimensional and two dimensional analysis, using plate elements for blades and axisymmetrical ring for the disk coupled by substructuring technique. The second implements axisymmetric anisotropic ring elements for the blades and the isotropic ring elements for the disk. A dynamic analysis of the blade with the finite element method is also presented. As an example the various methods are applied to the centrifugal compressor design of the FIAT 6803 engine and compared with results of experimental investigation. J.M.S.

N79-27159# Pisa Univ. (Italy). Inst. di Macchine.
PREDICTION OF AEROELASTIC INSTABILITIES IN ROTORCRAFT
Dino Dini *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 29 p refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

Design of modern rotorcraft engines requires that aeroelastic considerations be included for prediction of instabilities due to engines-rotors-airframe interference. Computational approaches are presented which have generality in the selection of stress analysis methods and are applicable to rotorcrafts involving a large number of operation variables. An instability criterion for the prediction of fatigue effects of alternating stresses on engine structural integrity is identified and applied to the corresponding airframe behavior during high speed forward flight and severe rotorcraft maneuvers. J.M.S.

N79-27160# National Gas Turbine Establishment, Pyestock (England).
APPLICATION OF ENGINE USAGE ANALYSIS TO COMPONENT LIFE UTILIZATION
M. Holmes *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 15 p refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

Engine parameters were monitored during operation in service aircraft to investigate the maximum life potential of aero engine components. Analytical methods were used for determining low cycle fatigue. The influence of data availability and computing capability on the procedures were investigated by comparing the software appropriate to an airborne unit monitoring engine revolutions per minute with that for a ground based computing facility analyzing recorded flight data. R.E.S.

N79-27161# Pratt and Whitney Aircraft Group, East Hartford, Conn. Commercial Products Div.
BOUNDARY-INTEGRAL EQUATION ANALYSIS OF AN ADVANCED TURBINE DISK RIM SLOT
R. B. Wilson, R. G. Potter, and J. K. Wong *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 9 p refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

The mathematical basis and numerical implementation of the boundary-integral equation method are presented. The method was shown to be capable of predicting rapidly varying stress and strain fields in complex geometries, using either plane triangular or higher order elements. Ease of geometrical modeling and higher order boundary data variation combined to make shape function based codes most efficient for design analysis use. R.E.S.

N79-27162*# Massachusetts Inst. of Tech., Cambridge. Dept of Aeronautics and Astronautics.
ENGINE ROTOR BURST CONTAINMENT/CONTROL STUDIES
Emmett A. Witmer, Thomas R. Stagliano, and Jose J. A. Rodal *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 30 p refs (For primary document see N79-27148 18-07)
(Grant NGR-22-009-339)
Avail: NTIS HC A21/MF A01

Investigations on the impact-interaction of both complex engine rotor fragments and simple fragments with various types of single-layer and multilayer containment structures were reviewed. The resulting data were used (1) to develop empirical design rules and (2) to evaluate proposed theoretical methods for predicting the impact induced responses of containment structures. Examples of typical numerical methods for predicting the large deflection, elastic-plastic transient structural responses of simple two dimensional and three dimensional containment shields were illustrated. R.E.S.

N79-27163# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
SMALL TURBINES: EXPERIENCES WITH DISK RUPTURES [PETITES TURBOMACHINES: EXPERIENCES SUR LA RUPTURE DES DISQUES]
J. M. Foueillassar and A. R. VonDerMuhll *In its* Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 16 p In FRENCH (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

On turbines with small dimensions, the construction of casings capable of integrally retaining all the debris in the case of disk rupture can be realized with a very acceptable mass penalty. Practical experience and systematic tests of disk rupture under real operating conditions provide useful data concerning the shape and size of the most penetrating elements; the shape and most efficacious arrangement of elements serving as casings; and the most adaptable materials to be used for casings. For rotors whose security relies on the fact that the blades tear away without disk rupture, or for the cylinder, properly so-called, in case of failure from excess speed, the tests equally confirm the confidence that can be put in casing elements constructed according to the same principles of evaluation. Transl. by A.R.H.

N79-27164# Sussex Univ., Brighton (England).
AN INVESTIGATION OF VIBRATION DAMPERS IN GAS-TURBINE ENGINES
R. Holmes and B. Humes (Roy. Armament Res. and Develop. Estab., Sevenoaks, Engl.) *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 10 p refs Sponsored in cooperation with the Natl. Gas Turbine Estab. (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

The feasibility of using the squeeze-film both as a damper and a load bearing member was investigated. It was found that when the squeeze-film provided a load carrying capability as well as damping, cavitation, which has a deleterious effect, is generated in the film. Equations are presented for predicting the

vibration amplitude and the force transmitted to the engine frame when the squeeze-film is used for damping. F.O.S.

N79-27165# Sulzer Bros. Ltd., Winterthur (Switzerland).
MODAL ANALYSIS OF COMPRESSOR BLADES BY MEANS OF IMPULSE EXCITATION
U. Bolleter, J. Eberl, and E. Buehlmann *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 11 p refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

An experimental method of modal analysis is described which is based on impulse excitation. Due to low damping the application to free-standing turbomachinery blading requires special care in the digital processing of the data. The modal behavior, particularly with respect to bending and torsional coupling, is demonstrated using a subsonic compressor blade as an example. Measured damping coefficients and inter-modal phase differences are discussed. Applications of the quantitative results of stress responses to point excitation are illustrated. Thus stresses due to various assumed loads allow one to judge the importance of higher modes, stress ratios for various modes can be an aid to failure analysis, and multiple strain measurements can yield an estimate of aerodynamic loads. F.O.S.

N79-27166# Naval Air Propulsion Test Center, Trenton, N.J. Research and Technology Div.
ROTOR BUST PROTECTION: DESIGN GUIDELINES FOR CONTAINMENT
James T. Salvino, Gaetan J. Mangano, and Robert A. DeLucia *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 16 p refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

The results are presented of tests that were conducted to develop guidelines for the weight optimum design of turbine rotor burst fragment containment rings. The ring materials used for each of the several ring configurations were Kevlar 29 cloth, centrifugally cast 4130 steel and coiled 304 stainless steel. A comparative assessment of the containment capability for each material is provided in terms of a specific energy variable that was developed for this purpose. Also included in this assessment is the effect of the number of equal pie sector shaped fragments on the ring containment capability. Author

N79-27167# Boeing Co., Seattle, Wash.
ENGINE/AIRCRAFT STRUCTURAL INTEGRATION: AN OVERVIEW
T. E. Dunning, M. N. Aarnes, and G. L. Bailey *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 35 p refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

The structural installation of engines in aircraft is discussed in terms of modeling techniques, development of a computerized data base, and planning the propulsion system tests. Problems encountered in engine installation are described. F.O.S.

N79-27168# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Military Airplane Div.
DYNAMIC PRESSURE LOADS IN THE AIR INDUCTION SYSTEM OF THE TORNADO FIGHTER AIRCRAFT
K. W. Lotter and N. C. Bissinger *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 20 p refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

The engine fact, duct and forward intake peak pressures applied for structural design of the European fighter airplane, Tornado, and the experimental data obtained during the development phase from full scale intake/engine compatibility test are described. S.E.S.

N79-27169# National Aerospace Lab., Amsterdam (Netherlands). Performance and Evaluation Dept.
HANDLING PROBLEMS THROUGH COMPRESSOR DETERIORATION
J. P. K. Vleghert *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 7 p (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

RNLAF has experienced performance loss and an increased rate of in flight compressor stalls due to compressor deterioration of some of their 15 year old engines. The Maintenance Depot test bed showed that significant loss of air mass flow occurred near the surge line under conditions which were not covered by the normal post overhall acceptance tests. Impending stall was always preceded by increasing fluctuations, although the level of these pressure fluctuations varied with different engines. A method was developed to routine check for this phenomenon. The surge margin of the affected engines was recovered by replacing the rear compressor casing. S.E.S.

N79-27170# Pratt and Whitney Aircraft of Canada Ltd., Longueuil (Quebec).
SMALL TURBINE ENGINE INTEGRATION IN AIRCRAFT INSTALLATIONS
M. Botman and R. K. Blinco *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 12 p (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

Various design and development problems related to the integration of small turbine engines in aircraft installations are reviewed. Important considerations in turbo-prop installations are vibration transmissibility, propeller-whirl flutter, engine structure strength and stiffness, mount failure modes, and nacelle clearances. Requirements are adequate compartment ventilation and engine oil cooling with minimum aerodynamic loss. The installations of the PT6 series of turbo-prop engines are discussed. S.E.S.

N79-27171# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France).
DETERMINING THE DYNAMIC RESPONSE DUE TO AN IMBALANCE AT THE ATTACHMENTS OF A MOTOR ON A POD [DETERMINATION DES EFFORTS DYNAMIQUES DUS A UN BALOURD AUX ATTACHES D'UN MOTEUR MONTE EN PODE]
B. Schneider *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 16 p refs In FRENCH (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

The loss of a rotor blade produces an imbalance which is transmitted to the attachments of an engine on a pod. The reactions of these attachments are calculated as a function of the angular velocity of the rotor by means of the matrix of flexibility of the pod, of inertial characteristics of the rigid engine and of the generalized mass, as well as of the frequency of the damping of the distortions of the flexible modes of the motor. A problem is seen regarding the complexity of the vibration tests of an engine; the flexible modes of the engine, whose frequency remains too low for intervening in the coupling, cannot be used because they have not been completely measured. Furthermore, it seems that the damping mode is a fundamental parameter, as in all phenomena of excitation; therefore, particular care must be taken to its determination outside of the test itself. At the same time, the calculation of generalized forces requires knowledge of the deformation of the rotor for each flexible mode used, which imposes the use of specialized lock-ons outside of vibration tests. Transl. by A.R.H.

N79-27172# British Aerospace Aircraft Group, Preston (England). Advanced Projects Dept.
INTEGRATION OF AN AIRFRAME WITH A TURBOFAN AND AFTERBURNER SYSTEM
Michael S. Wooding and Harry Hurdis (Rolls-Royce Ltd., Derby, Engl.) *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 10 p (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01

Alternative ways for improving the performance of installed military engines are described. The weight, performance, and cost tradeoffs that might result for a single engined fixed wing combat aircraft are discussed. S.E.S.

N79-27173# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.

A NEW FACILITY FOR STRUCTURAL ENGINE TESTING

Robert L. B. Swain and James G. Mitchell *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 6 p (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

A test facility to simulate the maneuver environment an engine actually experiences in flight is presented. The facility and its potential benefits to the engine development process are described. S.E.S.

N79-27174# Centre d'Essais des Propulseurs, Orsay (France).

THE INTEGRITY OF AIRCRAFT JET ENGINES UNDER THE IMPACT OF FOREIGN BODIES [INTEGRITE DES REACTEURS D'AVIONS SOUS IMPACTS DE CORPS ETRANGERS]

Dominique Hedon and Jean Barrere *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 13 p In FRENCH (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

The ingestion of foreign bodies, especially of birds, remains a major hazard to aircraft. The improvement of the resistance of engines to impacts has, for several years, been the object of important efforts on the part of aircraft manufacturers working with official services. The Centre D'Essais des Propulseurs furnished a special installation for this type of research. The experience acquired from tests made show that consideration of impact resistance must be made part of engine design and can influence the general architecture of the project as well as the definition of internal details or of preparations. Transl. by A.R.H.

N79-27175# Rolls-Royce Ltd., Derby (England). Aero Div.

THE EFFECT OF INTAKE CONDITIONS ON SUPERSONIC FLUTTER IN TURBOFAN ENGINES

D. G. Halliwell *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 8 p refs (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

The nature of supersonic flutter, to which high tip speed, front stage fans of modern aircraft turbofan engines are susceptible, is introduced. The effect of varying engine intake conditions of altitude, flight speed and ambient temperature were examined, and test data was compared with theory. Some important flight conditions for minimum flutter margins in typical civil and military applications are outlined. The effect of engine intake type is then covered with respect to the degree of pressure distortion presented to the fan. A tentative relationship is derived between this distortion and flutter onset speed. Author

N79-27176# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Antriebstechnik.

UNSTEADY ROTOR BLADE LOADING IN AN AXIAL COMPRESSOR WITH STEADY-STATE INLET DISTORTIONS

M. Lecht and H. B. Weyer *In* AGARD Stress, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 13 p refs (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

A steady state measuring technique with conventional probes and pressure tapes combined with an adequate data analysis was used to investigate the unsteady rotor flow with particular respect to the variation of the blade loading during rotor revolution. Some relevant results of this investigation are submitted and discussed. M.M.M.

N79-27177# Liege Univ. (Belgium). Inst. de Mecanique.

DISTORTIONS, ROTATING STALL AND MECHANICAL SOLICITATIONS

J. Colpin *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 24 p refs (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

A one stage axial flow compressor is studied aerodynamically and mechanically when operating with moldistributed inlet flow, i.e. inlet flow total pressure distortions and rotating stall. A theoretical model is presented which calculates the distortion propagation through the compressor stage. That enables the computation of the unsteady aerodynamic loading of the rotor blades. The theoretical results are successful compared with the measured flow fields. An experimental study defines the rotating stall characteristics of the compressor stage and relates the blades vibrations and stresses with the existence of a distortion and/or rotating stall cell. Author

N79-27178# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).

STUDY IN A STRAIGHT CASCADE WIND TUNNEL OF AEROELASTIC INSTABILITIES IN COMPRESSORS

Edmond Szechenyi, Henri Loiseau, and Brigitte Maquennenhan (SNECMA) *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 13 p refs In FRENCH; ENGLISH summary (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01

Most of the aeroelastic instabilities encountered in turbomachines, in particular in compressor first stages, occur in flow conditions that can not be calculated on purely theoretical bases. The very nature of these instabilities is not always known, and tests in a straight cascade wind tunnel should make it possible, first to understand the physical mechanisms of phenomena observed in compressors. The experimental results would then be used to develop mathematical models to be used for prediction calculations. A straight cascade wind tunnel permits the simulation of subsonic and transonic flows up to very close to Mach 1 with angles of attack reaching 12 degrees, and of supersonic flows at fixed Mach numbers thanks to interchangeable nozzles. The first tests in this facility brought to light several kinds of flutter. The parametric study, or which the paper gives the first results, shows the influence of reduced frequency, incidence, pitch axis position and Mach number. A few results obtained in supersonic regime are also given. A.R.H.

N79-27179*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

REVIEW OF THE AGARD S AND M PANEL EVALUATION PROGRAM OF THE NASA-LEWIS SRP APPROACH TO HIGH-TEMPERATURE LCF LIFE PREDICTION

Marvin H. Hirschberg *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 9 p refs (For primary document see N79-27148 18-07)

Avail: NTIS HC A21/MF A01 CSCL 21E

The strain range partitioning SRP method method presented is a significant step forward in high temperature low cycle fatigue life prediction. Several concerns and recommendations regarding SRP were described. These dealt primarily with the problems associated with the application of SRP to cases involving small inelastic strains (and therefore long lives). The difficulties associated with partitioning these narrow hysteresis loops and the present inability of SRP to handle mean stress effects were also noted. M.M.M.

N79-27180# Detroit Diesel Allison, Indianapolis, Ind. Cascade and Flow Systems Research.

THE UNSTEADY AERODYNAMICS OF A CASCADE IN TRANSLATION

Sanford Fleeter, Ronald E. Riffel, Thomas H. Lindsey, and Mark D. Rothrock *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 13 p refs (For primary document see N79-27148 18-07) (Contract N00014-72-C-0351)

Avail: NTIS HC A21/MF A01

The fundamental time variant translation mode aerodynamics are determined for a classical airfoil cascade in a supersonic inlet flow field over a range of interblade phase angles at a realistic reduced frequency value. These experimental data are then correlated with predictions obtained from an appropriate state-of-the-art harmonically oscillating flat plate cascade aerodynamic analysis. M.M.M.

N79-27181*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SUPERSONIC UNSTALLED FLUTTER
J. J. Adamczyk, M. E. Goldstein, and M. J. Hartmann *In* AGARD Stresses, Vibrations, Struct. Integration and Eng. Integrity (Including Aeroelasticity and Flutter) Apr. 1979 14 p refs (For primary document see N79-27148 18-07)
Avail: NTIS HC A21/MF A01 CSCL 21E

A parametric study to show the effects of cascade geometry, inlet Mach number, and backpressure on the onset of single and multi degree of freedom unstalled supersonic flutter is presented. Several of the results are correlated against experimental qualitative observation to validate the models. M.M.M.

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N79-27182*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A COMPARISON OF THE V/STOL HANDLING QUALITIES OF THE VAK-191B WITH THE REQUIREMENTS OF AGARD REPORT 577 AND MIL-F-83300
Seth B. Anderson Jul. 1979 38 p refs
(NASA-TP-1494; A-7117) Avail: NTIS HC A03/MF A01 CSCL 01C

The handling qualities of the VAK-191B VTOL aircraft are compared with current V/STOL handling qualities requirements. The aircraft handling qualities were superior to other V/STOL fighter aircraft. Several deficiencies which would seriously affect shipboard V/STOL operation includes: (1) poor hovering precision; (2) inadequate mechanical control characteristics; (3) nonlinear pitch and roll response; (4) an uncommanded movement of the height control lever; (5) low pitch control sensitivity; (6) excessive dihedral effect; and (7) inadequate overall thrust response. The attitude command control system resulted on reduced pilot workload during hover and low speed flight. S.E.S.

N79-27183# CalspanAdvanced Technology Center, Buffalo, N. Y.
EFFECTS OF CONTROL SYSTEM DYNAMICS ON FIGHTER APPROACH AND LANDING LONGITUDINAL FLYING QUALITIES, VOLUME 1 Interim Report, Jun. 1977 - Mar. 1978
Rogers E. Smith Mar. 1978 232 p refs
(Contract F33615-73-C-3051; AF Proj. 2403)
(AD-A067550; CALSPAN-AK-5280-F-12; AFFDL-TR-78-122-Vol-1) Avail: NTIS HC A11/MF A01 CSCL 01/3

The effects of significant control system dynamics on fighter approach and landing longitudinal flying qualities were investigated in flight using the USAF/Calspan variable stability NT-33 aircraft. Two pilots evaluated 49 different combinations of control system and short period dynamics while performing representative approach and landing tasks. The landing task for the majority of the evaluations included an actual touchdown. Pilot rating and comment data, supported by task performance records, indicate that the landing task, in particular the last 50 ft of the task, is clearly the critical task for aircraft with significant control system lags. For these aircraft, a sharp degradation in flying qualities takes place during this critical phase of the landing task; for example, severe pilot induced oscillations occurred during the landing task but were not in evidence during the approach task. The results provide a data base for the development of suitable flying qualities requirements which are applicable to aircraft with significant control system dynamics; the results show that the present landing approach requirements in MIL-F-8785B (ASG) are not adequate; in particular, they are not applicable to aircraft with complex flight control systems. Author (GRA)

N79-27184# Technische Univ., Berlin (West Germany). Inst. fuer Luft und Raumfahrt.
STUDY OF THE THEORETICAL TO REAL CORRESPONDANCE OF AN OPTIMAL CONTROL MODEL AND THE SIGNIFICANCE OF THIS MODEL FOR THE DESCRIPTION OF WORKING METHODOLOGY WITH PARTLY AUTOMATED AIRCRAFT GUIDANCE AND CONTROL SYSTEMS [BEITRAG ZUR IDENTIFIZIERARBEIT DES BBN-MODELLS UND DIE BEDEUTUNG DES MODELLS ALS BESCHREIBUNGSFORM DER ARBEITWEISSE DES MENSCHEN IM TEILAUTMATISCHEN FLUGFUEHRUNGSSYSTEM]
Uwe Kirchhoff 1978 170 p refs In GERMAN
(ILR-35; ISBN-3-7983-0640-0) Avail: NTIS HC A08/MF A01

Global concepts for the interaction between man and partly automated aircraft guidance and control systems were studied, emphasis being given to working methodology. Linear systems are discussed. An attempt is made to show up to what point the optimal control model provides a good description of the interactions taking place. The faults occuring in this model are determined, and a model in which these faults are eliminated is proposed being fulfilled. Author (ESA)

N79-27078*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TREATMENT OF THE CONTROL MECHANISMS OF LIGHT AIRPLANES IN THE FLUTTER CLEARANCE PROCESS
Elmar J. Breitbach *In its* Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 437-466 refs (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 01C

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N79-27185*# Douglas Aircraft Co., Inc., Long Beach, Calif.
AIRCRAFT AND AVIONIC RELATED RESEARCH REQUIRED TO DEVELOP AN EFFECTIVE HIGH-SPEED RUNWAY EXIT SYSTEM
M. L. Schoen, J. E. Hosford, J. M. Graham, Jr., O. W. Preston, R. S. Frankel, and J. B. Erickson Jun. 1979 115 p refs
(Contract NAS1-15545)
(NASA-CR-159075) Avail: NTIS HC A06/MF A01 CSCL 01E

Research was conducted to increase airport capacity by studying the feasibility of the longitudinal separation between aircraft sequences on final approach. The multidisciplinary factors which include the utility of high speed exits for efficient runway operations were described along with recommendations and highlights of these studies. M.M.M.

N79-27186*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EARTH WINDS, FLOW QUALITY, AND THE MINIMUM-PROTECTION INLET TREATMENT FOR THE NASA AMES 80- BY 120-FOOT WIND TUNNEL NONRETURN CIRCUIT
William T. Eckert and Kenneth W. Mort Jun. 1979 20 p refs Prepared in cooperation with Army Aviation Res. and Dev. Command, Moffett Field, Calif.
(NASA-TM-78600; AVRADCOM-TR-79-27; A-7877) Avail: NTIS HC A02/MF A01 CSCL 01E

The effect of the external wind on the quality of the flow in the test section was studied. The flow quality achievable with the complex treatment as well as that with the planned minimum treatment system is discussed. A scale model coupled with on site wind measurements demonstrated that the minimum treatment selected can provide adequate testing capabilities in the presence of the prevailing local winds, and that test programs will not be significantly affected by adverse wind effects on the test section flow quality. S.E.S.

N79-27187# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.

INTERFEROMETRIC TECHNIQUES AND DATA EVALUATION METHODS FOR THE UTIAS 10 cm x 18 cm HYPERVELOCITY SHOCK TUBE Interim Report

G. Ben-Dor and B. T. Whitten Mar. 1979 65 p refs
(Grant AF-AFOSR-3303-77; AF Proj. 2307)
(AD-A067957; UTIAS-TN-208; AFOSR-79-0514TR) Avail: NTIS HC A04/MF A01 CSCL 20/4

The UTIAS 10 cm x 18 cm Hypervelocity Shock Tube has been used in recent years to study ionizing shock structures, flat-plate and side-wall boundary layers and nonstationary oblique shock-wave diffractions over compression corners. These phenomena were recorded using a 23-cm dia field of view Mach-Zehnder interferometer equipped with a giant-pulse dual-frequency ruby laser. In order to extract the maximum amount of data in these complex flows a digital evaluation method was employed. For this technique a new approach to the theory of interference was developed. In this approach the spatial coordinates (x,y) of the various lines of interference (fringes) on the interferograms are put into digital form, thereby making a computer analysis possible. The experimental technique and instrumentation associated with the various measurements involved in research using the UTIAS 10 cm x 18 cm Hypervelocity Shock Tube are described. Finally the maximum possible absolute and relative errors associated with these measurements are calculated for four different gases (argon, krypton, oxygen and nitrogen) which are usually used as test gases. GRA

N79-27188# Air Force Human Resources Lab., Brooks AFB, Tex.

F-15 FLIGHT SIMULATOR: DEVELOPMENT AND ANALYSIS OF COMPUTER SCORING ALGORITHM Final Report, Jun. - Sep. 1977

Michael J. McDonald, Bruce A. Smith, David W. Evans, Lester H. Baer, and William H. Nelson Mar. 1979 30 p refs
(AD-A067765; AFHRL-TR-78-72) Avail: NTIS HC A03/MF A01 CSCL 05/9

This study was designed to develop and evaluate the computer scoring algorithm of the F-15 flight simulator. Subjects were F-15 pilots in the grade of 1st Lt. through Lt. Col. with previous flying experience commensurate with grade and operational assignments. Evaluation involved simultaneous scoring by the computer and Instructor Pilots (IP) of flight departures and approaches. Both scores were then compared to estimate the validity of the computer algorithm. Departure scores were moderately correlated; however, approach scores exhibited moderate to high negative correlation. Interaction from the IPs indicated that scoring parameters measured by the computer were correct. It was determined that the negative correlations on the approaches were a result of the computer initiating scoring whenever a certain range boundary was reached, whereas the IPs began scoring only when the appropriate legs of the approaches were being flown. Because of the correlation of the departure scores, it was concluded that with improvements to the computer scoring procedures for the approaches, the scoring algorithms of the F-15 flight simulator could provide a valuable tool for evaluation of fighter pilots. GRA

N79-27189# ARO, Inc., Arnold Air Force Station, Tenn.

AEROPROPULSION SYSTEMS TEST FACILITY RAKE CALIBRATION TEST IN TUNNEL A Final Report

W. A. Crosby AEDC Dec. 1978 35 p ref
(AD-A068975; AEDC-TSR-78-V49) Avail: NTIS HC A03/MF A01 CSCL 20/4

A pressure test was conducted in the VKF Tunnel A to obtain calibration data on the APTU Free-Jet Nozzle Calibration Rake. The test covered the supersonic Mach number range of 1.76, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, and 5.0, nominally, at a free-stream unit Reynolds number of 5.0 million per foot. The angle-of-attack range was -6 to +6 deg with typical roll angles of 0 and -90 deg. Model flow-field Schlieren photographs were obtained at all Mach numbers of 0 deg and positive angles-of-attack. GRA

N79-27190# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.

A LONG STROKE ISENTROPIC FREE PISTON HYPERSONIC WIND TUNNEL

R. A. East and A. M. S. Qasrawi Aug. 1978 45 p refs
(AASU-334) Avail: NTIS HC A03/MF A01

The range of operating conditions for light free piston compression facilities was extended to those appropriate (avg. T base = 605K, avg. p base = 90 bar) for providing a uniform supply of test gas (nitrogen) to a high Mach number (M = 6.85) wind tunnel nozzle. A relatively long stroke and small diameter tube, which is structurally more efficient for high pressure and high temperature operation, was chosen for this purpose. The maximum running time achieved at avg. p = 90 bar and avg. T = 605K was 0.54 sec. Test results show that although straight forward long stroke operation of free piston compressors does not provide compressed gas conditions which are as uniform as those for short stroke tubes, complete compensation is obtained using prescribed initial temperature distributions of preheated tubes. This gives excellent flow uniformity enabling the tunnel to be used for dynamic stability tests on blunt axisymmetric shapes at Reynolds numbers based on body length of up to 6.5 x 1,000,000. Author (ESA)

N79-27191# Oxford Univ. (England). Dept. of Engineering Science.

EXTENSION OF RUNNING TIME IN THE RAE HYPERSONIC SHOCK TUNNEL

D. L. Schultz 1978 14 p refs
(OUEL-1260/78) Avail: NTIS HC A02/MF A01

The running time performance of the RAE 6 inch shock tunnel as a LICH (Ludwig tube isoentropic compression heating) or as a free piston compressor (FPC) is compared with its present capability as a function of total temperature and nozzle throat area. Positive results obtained in this analysis suggest the feasibility of proceeding with more detailed design studies. LICH mode and FPC mode schemes for the RAE 6 inch shock tunnel are shown. Author (ESA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N79-27192*# General Research Corp., McLean, Va.

EARTH-TO-ORBIT REUSABLE LAUNCH VEHICLES: A COMPARATIVE ASSESSMENT Final Report

Ramon L. Chase Feb. 1978 202 p refs
(Contract NASw-2973)
(NASA-CR-157444; WGRC-78-4873; Rept-709-02-CR) Avail: NTIS HC A10/MF A01 CSCL 22A

A representative set of space systems, functions, and missions for NASA and DoD from which launch vehicle requirements and characteristics was established as well as a set of air-breathing launch vehicles based on graduated technology capabilities corresponding to increasingly higher staging Mach numbers. The utility of the air-breathing launch vehicle candidates based on lift-off weight, performance, technology needs, and risk was assessed and costs were compared to alternative concepts. The results indicate that a fully reusable launch vehicle, whether two stage or one stage, could potentially reduce the cost per flight 60-80% compared to that for a partially reusable vehicle but would require advances in thermal protection system technology. A two-stage-to-orbit, parallel-lift vehicle with an air-breathing booster would cost approximately the same as a single-stage-to-orbit vehicle, but the former would have greater flexibility and a significantly reduced developmental risk. A twin-booster, subsonic-staged, parallel-lift vehicle represents the lowest system cost and developmental risk. However, if a large supersonic turbojet engine in the 350,000-N thrust class were available, supersonic staging would be preferred, and the investment in development would be returned in reduced program cost. A.R.H.

N79-27193*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

SPACE AUGMENTATION OF MILITARY HIGH-LEVEL WASTE DISPOSAL

Thomas English, Lester Lees, and Edward Divita 1 May 1979 54 p refs
(Contract NAS7-100)

(NASA-CR-158771; JPL-Pub-79-45) Avail: NTIS HC A04/MF A01 CSCL 22A

Space disposal of selected components of military high-level waste (HLW) is considered. This disposal option offers the promise of eliminating the long-lived radionuclides in military HLW from the earth. A space mission which meets the dual requirements of long-term orbital stability and a maximum of one space shuttle launch per week over a period of 20-40 years, is a heliocentric orbit about halfway between the orbits of earth and Venus. Space disposal of high-level radioactive waste is characterized by long-term predicability and short-term uncertainties which must be reduced to acceptably low levels. For example, failure of either the Orbit Transfer Vehicle after leaving low earth orbit, or the storable propellant stage failure at perihelion would leave the nuclear waste package in an unplanned and potentially unstable orbit. Since potential earth reencounter and subsequent burn-up in the earth's atmosphere is unacceptable, a deep space rendezvous, docking, and retrieval capability must be developed. J.M.S.

N79-27194# Indian Space Research Organization, Bangalore. Space Applications Centre.

INDIAN NATIONAL COMMITTEE FOR SPACE RESEARCH REPORT TO COSPAR Technical Report No. 17, 1 Jan. - 31 Dec. 1978

P. D. Bhavsar, comp and P. N. Pathak, ed. 1979 49 p Presented at 22nd COSPAR Meeting, Bangalore, India, May - Jun. 1979 Avail: NTIS HC A03/MF A01

The organizations and facilities, space applications, international cooperation, and current research in India are reported. M.M.M.

N79-27195# National Research Council of Canada, Ottawa (Ontario).

CANADA REPORT TO COSPAR

May 1979 28 p Partly in ENGLISH and FRENCH Presented at 22nd Meeting, Bangalore, India, May 1979 Avail: NTIS HC A03/MF A01

Research performed at Canadian universities on space exploration, astrophysics, meteorology, plasmas, solar activity, and other disciplinary fields related to space science were reported. Telecommunication, energy, mines, fisheries, and environment were discussed. M.M.M.

N79-27196# Science Council of Japan, Tokyo. National Committee on Space Research.

JAPAN NATIONAL REPORT ON SPACE RESEARCH

Apr. 1979 65 p Presented at the 22nd Meeting of the ICSU Comm. on Space Res., Bangalore, India, 29 May - 9 Jun. 1979 Original contains color illustrations Avail: NTIS HC A04/MF A01

Satellite, balloon, and rocket observations are reported and major achievements in the following areas are summarized: stratosphere and mesosphere; ionosphere; magnetosphere; solar wind; planets and meteorites; cosmic and galactic radiation; and materials and life sciences in space. A bibliography of space sciences documents generated is included. Cooperation in the space shuttle program is discussed as well as satellite geodesy and satellites in preparation. A.R.H.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N79-27197# Academy of Sciences (USSR), Moscow. Inst. of Space Research.

UNMODELED PERTURBATION EFFECT ON THE ORBIT DETERMINATION ACCURACY

B. T. Bakhshiyan, R. R. Nazirov, and P. E. Eliasberg 1978 11 p refs

(PR-433) Avail: NTIS HC A02/MF A01

A mathematical procedure for estimating orbital parameters with better accuracy in the presence of unmodeled perturbations is described. Expressions for the accuracy of the estimate of the given parameters, assuming that the characteristics of the mathematical expectation are known and are in the correlation function for these perturbations, are given. An example dealing with the effect of perturbing acceleration on the accuracy of the determination of pericenter altitude for an osculating hyperbolic orbit of a spacecraft entering the atmosphere of Jupiter is given. Author (ESA)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N79-27198*# National Aeronautics and Space Administration, Washington, D. C.

DESCRIPTION OF THE TC 125 ABOARD THE MERCURY SIMULATOR

Apr. 1979 24 p Transl. into ENGLISH of Presentation du T.C. 125 sur Simulateur Mercure (Velizy) (France), no. 12, SDT/PN, 6 Feb. 1979 19 p Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original document prepared by Centre d'Essais en Vol, Bretigny-sur-orge, France

(Contract NASW-3199)

(NASA-TM-75479) Avail: NTIS HC A02/MF A01 CSCL 14B

Two distinct phases of the TC.125 aboard the Mercury Simulator were described to pilots at a meeting in 1979. A three hour 'hand on' phase, during which the pilot learns to use the system, and second; a two hour evaluation phase, during which the pilot analyzes the TC.125 and pratices making typical approaches are presented. S.E.S.

N79-27199*# Northrop Services, Inc., Houston, Tex.

STANDARD OPERATING PROCEDURES, WATER IMMERSION FACILITY, REVISION B

Mar. 1979 178 p Revised

(Contract NAS9-13000)

(NASA-CR-160257; MSC-07652-Rev-B) Avail: NTIS HC A09/MF A01 CSCL 14B

General guideline procedures to identify those factors that are common to all spacecraft design laboratory support group emergency procedures and to establish the basic rescue plan are presented. This eliminates needless repetition of the fundamentals from the other, more specific procedures. M.M.M.

N79-27200# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex. Atmospheric Science Lab.

ENGINEERING FLIGHT TESTS OF RANGE METEOROLOGICAL SOUNDING SYSTEM RADIOSONDE

Bruce W. Kennedy, Arthur Kinghorn, and B. R. Hixon Feb. 1979 51 p refs

(DA Proj. 1L1-62111-AH-71)

(AD-A067430; ERADCOM/ASL-TR-0022) Avail: NTIS HC A04/MF A01 CSCL 04/2

Engineering flight tests of the Range Meteorological Sounding System (RMSS) radiosonde were conducted at Kwajalein Missile Range (KMR) during January and April 1978. The purpose of the program was to correct known deficiencies in the sonde and to test sensors and air ducts for accuracy and responsiveness. Fourteen modified and standard RMSS sonde releases were made. Results showed that the RMSS temperature sensor compares favorably with the National Weather Service rawinsonde. Humidity can be measured, but when insulation and solar shielding are added to the package, results are improved. Operational problems were encountered with the RMSS sonde, and design deficiencies were discovered. Author (GRA)

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N79-27201# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
MISSILE AERODYNAMICS, VOLUME 1
Apr. 1974 309 p refs Lecture held at Rhode-Saint-Genese, Belgium, 22-26 Apr. 1974 2 Vol.
(VKI-Lecture-Series-67-Vol-1) Avail: NTIS HC A14/MF A01

Missile design and development is reviewed in terms of the applicable aerodynamics. A general review of air-flight weapons and missile design options is given. Other topics dicussed include: general weapon aerodynamics, high incidence aerodynamics, base drag, aerodynamic controls, thrust vector control, spoiler controls weapon/aircraft interactions, and wing-body and wing-tail interference. For individual titles, see N79-27202 through N79-27210.

N79-27202# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
A BRIEF REVIEW OF AIR-FLIGHT WEAPONS
George G. Brebner *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 1 Apr. 1974 36 p (For primary document see N79-27201 18-15)
Avail: NTIS HC A14/MF A01

A brief review of the aerodynamics of airborne weapons is given. Guided and unguided, propelled and unpropelled weapons are considered along with the various components of missile design. The process of aerodynamic design of weapons is discussed. J.M.S.

N79-27203# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
GENERAL WEAPON AERODYNAMICS
George G. Brebner *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 1 Apr. 1974 40 p refs (For primary document see N79-27201 18-15)
Avail: NTIS HC A14/MF A01

The main aerodynamic effects, coefficients and derivatives which are of importance in the design of weapons are considered. Methods that may be used to estimate their values are indicated. J.M.S.

N79-27204# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
AERODYNAMIC CONTROLS
George G. Brebner *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 1 Apr. 1974 43 p refs (For primary document see N79-27201 18-15)
Avail: NTIS HC A14/MF A01

The control characteristics of deflected aerodynamic surfaces on guided weapons are considered. In the case of guided weapons all-moving surfaces are used due to the requirement for trimmed incidence and lateral acceleration. Controls at the tail and at the front of a weapon body, moving wing controls and controls placed within the wing planform are covered. In general, cruciform configurations are studied. J.M.S.

N79-27205# Royal Aircraft Establishment, Farnborough (England). Aerodynamics Dept.
WEAPON/AIRCRAFT INTERACTIONS
George G. Brebner *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 1 Apr. 1974 41 p refs (For primary document see N79-27201 18-15)
Avail: NTIS HC A14/MF A01

The aerodynamic aspects of weapon/aircraft interactions are considered. Emphasis is placed on drag of the aircraft/weapon combination, loads acting on the weapon during carriage, and disturbances experienced by the weapon after release or launch. Methods of determining installed drag, carriage loads, and trajectories are discussed. J.M.S.

N79-27206# British Aircraft Corp., Filton (England). Guided Weapons Div.
THRUST VECTOR CONTROL
John McC. Anderson *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 1 Apr. 1974 28 p (For primary document see N79-27201 18-15)
Avail: NTIS HC A14/MF A01

Advantages and disadvantages of thrust vector control (TVC) are discussed. Mechanical as well as fluid dynamic methods of TVC are briefly described. Secondary injection is also considered. J.M.S.

N79-27207# British Aircraft Corp., Filton (England). Guided Weapons Div.
SPOILER CONTROLS
John McC. Anderson *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 1 Apr. 1979 27 p (For primary document see N79-27201 18-15)
Avail: NTIS HC A14/MF A01

Advantages and disadvantages of mechanical and jet spoilers are given. Aerodynamic effects and the method of control are discussed. Application of spoiler systems to various missile designs is described. J.M.S.

N79-27208# British Aircraft Corp., Filton (England). Guided Weapons Div.
MISSILE CONFIGURATION DESIGN OPTIONS
Robert Bartlett *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 1 Apr. 1974 40 p (For primary document see N79-27201 18-15)
Avail: NTIS HC A14/MF A01

A general overview of missile design options is given. Body shapes, wings (major lifting surfaces), control surfaces, and missile stability are among the topics discussed. Factors considered include type of missile, velocity profile, guidance system, and motor design. Techniques/procedures used in development of missile design are included. J.M.S.

N79-27209# British Aircraft Corp., Filton (England). Guided Weapons Div.
BASE DRAG
Terence W. F. Moore *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 1 Apr. 1974 27 p refs (For primary document see N79-27201 18-15)
Avail: NTIS HC A14/MF A01

The base drag (pressure) on a blunt base body of revolution at supersonic speeds, with or without a single axisymmetric cold jet exhausting from a motor nozzle whose exit plane is in the plane of the base is discussed. This lecture, dealing with three topics covered includes: (1) physical flow mechanism and configuration design aspects; (2) empirical prediction methods; and (3) theoretical methods, including a review and preliminary assessment of a theoretical flow model. J.M.S.

N79-27210# British Aircraft Corp., Filton (England). Guided Weapons Div.
HIGH INCIDENCE AERODYNAMICS
Terence W. F. Moore *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 1 Apr. 1974 27 p refs (For primary document see N79-27201 18-15)
Avail: NTIS HC A14/MF A01

High incidence flow aspects of aerodynamics are discussed. The method used for predicting forces in the incidence plane is outlined. Some results of the wind tunnel tests on the basis of which the technique was compiled are shown. J.M.S.

N79-27211# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
MISSILE AERODYNAMICS, VOLUME 2
1974 273 p refs Lecture Ser. held at Rhode-Saint-Genese, Belgium, 22-26 Apr. 1974
(VKI-Lecture-Series-67-Vol-2) Avail: NTIS HC A12/MF A01

Lecture notes are presented on the following areas of missile aerodynamics: (1) missile trajectories, (2) aerodynamic interference, (3) missile control, (4) target simulators, and (5) ramjet engines and supersonic flight. For individual titles, see N79-27212 through N79-27216.

N79-27212# Messerschmidt-Boelkow G.m.b.H., Ottobrunn (West Germany).

DYNAMICS OF THE BOOST PHASE
Hans Gaidosch *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 2 1974 62 p refs (For primary document see N79-27211 18-15)
Avail: NTIS HC A12/MF A01

Problems associated with launching and boost were briefly reviewed. The main accent was on the aerodynamics and error analysis of the boost phase. Launch types were discussed superficially. R.E.S.

N79-27213# Messerschmidt-Boelkow G.m.b.H., Ottobrunn (West Germany).
THE CONSIDERATION OF WING-BODY AND WING-TAIL INTERFERENCE IN MISSILE-DESIGN
Gregor Greogoriou *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 2 1974 59 p refs (For primary document see N79-27211 18-15)
Avail: NTIS HC A12/MF A01

The interferences between wing and body and between wing and tail were discussed. The possiblities of determining aerodynamic coefficients were demonstrated. The accuracy of existing computing methods was also demonstrated. R.E.S.

N79-27214# Messerschmidt-Boelkow G.m.b.H., Ottobrunn (West Germany).
PLANNING, EXECUTION AND STATISTICAL EVALUATION OF HIT SIMULATIONS
U. Schwellinger *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 2 1974 48 p refs (For primary document see N79-27211 18-15)
Avail: NTIS HC A12/MF A01

The procedures for setting up hit simulations are presented. Requirements and programming details are described for the simulation model. Suggested statistical evaluation procedures for the simulation runs are described. R.E.S.

N79-27215# Messerschmidt-Boelkow G.m.b.H., Ottobrunn (West Germany).
THE APPLICATION OF RAM-TYPE ENGINES TO LONG-RANGE SURPERSONIC MISSILES
N. Voss *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 2 1974 49 p refs (For primary document see N79-27211 18-15)
Avail: NTIS HC A12/MF A01

Air intake problems, fuels, and performance characteristics of ram-type engines were discussed. A comparison of several kinds of ram-type engines with the conventional rocket propulsion system was presented. The efficiency of ram-type engines for long ranges and high speeds was also demonstrated. R.E.S.

N79-27216# Messerschmidt-Boelkow G.m.b.H., Ottobrunn (West Germany).
NOISE ADAPTIVE FILTER **c16**
W. Wiemer *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 2 1974 53 p refs (For primary document see N79-27211 18-15)
Avail: NTIS HC A12/MF A01

The linear filter theory, which in this case has time variable and noise dependent gains, was approximated by a time invariant model. Nonlinear filters were proposed whose bandwidth and gains changed automatically with input noise. The resulting nonlinear filters yielded better results than lag filters for guidance problems. In comparison with Kalman filters, however, they were suboptimal. R.E.S.

N79-27217*# Rockwell International Corp., Downey, Calif. Satellite Systems Div.
ERECTABLE SPACE PLATFORM FOR SPACE SCIENCES AND APPLICATIONS
Jun. 1979 399 p refs
(Contract NAS1-15322)
(NASA-CR-159091) Avail: NTIS HC A17/MF A01 CSCL 22B

The specific objectives of the study were to: (1) identify a viable conceptual design for the service module/platform; (2) assess the technology issues that must be faced in planning development; and (3) prepare an initial plan for bringing critical technologies up to acceptable levels. G.Y.

N79-27218# Lincoln Lab., Mass. Inst. of Tech., Lexington.
DEVELOPING, TESTING, AND OPERATING LINCOLN EXPERIMENTAL SATELLITES 8 AND 9 (LES-8/9)
William W. Ward 16 Jan. 1979 88 p refs Presented at EASCON-78, Arlington, Va., 27 Sep. 1978
(Contract F19628-78-C-0002)
(AD-A069095; TN-1979-3; ESD-TR-79-3) Avail: NTIS HC A05/MF A01 CSCL 22/2

This report presents a number of sidelights on the development, testing, and operation in orbit of Lincoln Experimental Satellites 8 and 9 (LES-8/9). The details of these matters have been published elsewhere. Significant factors contributing to the success of the LES-8/9 program (terminals as well as satellites) are identified. GRA

N79-27219# Harry Diamond Labs., Adelphi, Md.
ANALYSIS OF WIND TUNNEL TEST RESULTS OF FLUIDIC GENERATOR FOR HIGH-ALTITUDE ROCKET
Jonathan E. Fine Mar. 1979 32 p refs
(AD-A069172; HDL-TR-1877) Avail: NTIS HC A03/MF A01 CSCL 10/2

A ram-air-driven power supply for a proposed high-altitude rocket was tested in the Naval Surface Weapons Center supersonic wind tunnel facility. The wind tunnel data that corresponded to points on the trajectory providing the least ram-air energy showed that the generator operated throughout the test and produced a minimum of 26.4 Vrms into a simulated fuze load near the apex where pneumatic power input is minimal. A method of predicting generator voltage in flight from laboratory calibration data and expected flight conditions was verified for Mach numbers from 1.5 to 2.02 and free-stream total pressures of up to 20 lb/in sq in. abs (137 kPa). GRA

N79-27220# Naval Research Lab., Washington, D. C.
OPTIMUM LAUNCH VEHICLE SIZING Interim Report
Henry N. Ho and Frank D. Clarke 25 Apr. 1979 18 p refs
(AD-A068575; NRL-3976) Avail: NTIS HC A02/MF A01 CSCL 22/2

A FORTRAN program that computes the optimum sizing parameters of a multi-stage rocket in powered ascent has been developed. The computer program is based upon an optimization procedure, due to Ruppe, which maximized the payload weight to total launch vehicle weight. Based upon a simplified aerodynamic model, the optimization procedure is convenient to use and provides useful approximate values of launch vehicle sizing parameters for launch vehicle of n stages, where n = 0, 1, 2... A numerical example is given to illustrate the utility of the FORTRAN program. GRA

N79-27221# Pennsylvania State Univ., University Park. Dept. of Aerospace Engineering.
NUCLEAR POWERED SATELLITE STUDIES Annual Progress Report, 1 Jul. 1977 - 30 Jun. 1978
M. H. Kaplan Jun. 1978 83 p refs
(Contract EY-78-S-02-4045)
(COO-4045-3) Avail: NTIS HC A05/MF A01

Pertinent aspects, schedule, personnel, technology developments, and plans are discussed. Support in the area of nuclear space power technology is provided. Results were obtained and communicated to the scientific community including the activities over the past year. DOE

N79-27222# Dornier-System G.m.b.H., Friedrichshafen (West Germany).
FLIGHT TEST OF FOUR ESTEC HEAT PIPES AS A PART OF THE PAYLOAD PLANNER FOR LAUNCH ON AN ARIES ROCKET Final Report
H. Koch Paris ESA Aug. 1978 33 p
(Contract ESTEC-3315/77-NL-PP)
(ESA-CR(P)-1146) Avail: NTIS HC A03/MF A01

The launch of the ASTRO 8/II heat pipe payload on an ARIES rocket is presented. A technical description is given of the payload, the electrical ground support equipment, the power and timer system, and the experiment electronics. Some launcher data are also given. Pre-launch activites, flight, and flight events are reported. Flight results are tabulated. Author (ESA)

N79-27223# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Astronomische und Physikalische Geodasie.

FOURTEENTH-ORDER HARMONICS FROM ANALYSIS OF MEAN LONGITUDE VARIATIONS OF RESONANT SATELLITES

Christophe Reigber and Georges Balmino (CNES, Toulouse) 1977 14 p refs Presented at 19th COSPAR Meeting, Philadelphia, Jun. 1976 Sponsored jointly by the Deut. Forsch. Gemeinschaft and CNES

(TUM-Mitt-132) Avail: NTIS HC A02/MF A01

Mean longitude variations derived from orbits of nine different satellites were analyzed to set up a system of condition equations for 14th-order harmonics in the geopotential. The solution of this system obtained by 'least squares' collocation gives the 14th-order harmonics up to 30 degrees. Author (ESA)

N79-27224# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.

VERY LOW ALTITUDE DRAG-FREE SATELLITES

R. E. Fischell and R. B. Kershner Jan. 1979 25 p (PB-293271/3; APL/JHU/CP-065) Avail: NTIS HC A02/MF A01 CSCL 22B

In 1972, the Triad satellite fully demonstrated the operability and practicality of the drag-free satellite subsystem called DISCOS (disturbance compensation system). This system provided control propulsion to precisely counteract the effects of drag and radiation pressure, resulting in a pure ballistic trajectory. The use of such a system has not been seriously contemplated at extremely low altitudes because of the very large propellant requirements. The advent of the space shuttle (which is ideally suited to launching extremely heavy satellites to a very low altitude orbit) makes the use of DISCOS in extremely low altitude orbits economically attractive. Such extremely low altitude orbits both for single satellites and a pair of satellites can be used for many applications and science missions. GRA

N79-27225# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

GUIDANCE AND CONTROL FOR TACTICAL GUIDED WEAPONS WITH EMPHASIS ON SIMULATION AND TESTING

May 1979 144 p refs Lecture series presented at Rome, 4-5 Jun. 1979; Ankara, 7-8 Jun. 1979; Eglin, Fla. 11-12 Jun. 1979

(AGARD-LS-101; ISBN-92-835-1324-X) Avail: NTIS HC A07/MF A01

The areas reviewed include: (1) weapon delivery including targeting and acquisition; (2) missile control techniques; and (3) current guidance techniques. For individual titles, see N79-27226 through N79-27231.

N79-27226# Air Force Avionics Lab., Wright-Patterson AFB, Ohio.

TACTICAL MISSILE PERFORMANCE REQUIREMENTS: A METHODOLOGY FOR DEVELOPMENT

C. T. Maney *In* AGARD Guidance and Control for Tactical Weapons with Emphasis on Simulation and Testing May 1979 6 p (For primary document see N79-27225 18-15)

Avail: NTIS HC A07/MF A01

The philosophy by which tactical air launched missile design requirements are developed using the development planning process used by the United States Air Force is addressed. The mission to be accomplished including the countering influence of the threat was examined. The alternative approaches to the solution are compared. A tradeoff design analysis of subsystem and system performance, effectiveness and costs is presented. Typical generic factors of speed, maneuverability, range, and payload are discussed. S.E.S.

N79-27227# Royal Aircraft Establishment, Farnborough (England). Flight Systems Dept.

WEAPON DELIVERY AND ITS EVALUATION

P. Manville *In* AGARD Guidance and Control for Tactical Weapons with Emphasis on Simulation and Testing May 1979 23 p refs (For primary document see N79-27225 18-15)

Avail: NTIS HC A07/MF A01

The influences and constraints that govern the delivery of tactical air to ground guided weapons are reviewed. The need to consider the total weapon system delivery performance in the context of the real scenario is reported. The distinct roles of modelling, main-in-the-loop simulation, and flight demonstration are discussed. A sound technical choice to be made between alternative options is achieved. S.E.S.

N79-27228# Air Force Avionics Lab., Wright-Patterson AFB, Ohio. Systems Analysis and Simulation Branch.

NEW METHODS IN THE TERMINAL GUIDANCE AND CONTROL OF TACTICAL MISSILES

J. Gonzalez *In* AGARD Guidance and Control for Tactical Weapons with Emphasis on Simulation and Testing May 1979 23 p refs (For primary document see N79-27225 18-15)

Avail: NTIS HC A07/MF A01

The functions of major tactical missile subsystems and classical guidance laws are described. Some of the features of modern control and estimation theory are summarized. The major advantages and disadvantages of each technique, both in general and in relationship to short range air-to-air missile applications are presented. S.E.S.

N79-27229# Martin Marietta Corp., Orlando, Fla. Aerospace Div.

GUIDANCE SIMULATION TECHNIQUES

Philip C. Gregory *In* AGARD Guidance and Control for Tactical Weapons with Emphasis on Simulation and Testing May 1979 13 p refs (For primary document see N79-27225 18-15)

Avail: NTIS HC A07/MF A01

The economic and political constraints which allow, justify, and require flight control simulations are examined. Factors such as range time availability and cost increases are shown to drive the designer toward providing 100 percent assurance of each test. A six degree of freedom hybrid simulation is described, and equipment plus operating costs are identified and contrasted with range costs. The simulation described is an accurate aerodynamic simulation model used in a six degree of freedom (6-DOF) simulation program for an air defense missile. The program provides a 6-DOF simulation of the missile system, including detailed nonlinear models of the airframe and associated aerodynamics, the autopilot, inertial reference unit, control actuation system, and gyro and accelerometer sensors. Implemented on both digital and hybrid simulations, the 6-DOF simulation program serves as the primary tool for flight test planning, postflight data analyses, and preflight predictions of missile performance characteristics. M.M.M.

N79-27230# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Inst. fuer Dynamik der Flugsysteme.

MISSILE GUIDANCE TECHNIQUES

W. Hofmann and D. Joos *In* AGARD Guidance and Control for Tactical Weapons with Emphasis on Simulation and Testing May 1979 27 p refs (For primary document see N79-27225 18-15)

Avail: NTIS HC A07/MF A01

A unifying approach is proposed for the systematic investigation of missile guidance techniques in guidance law and information processing design. It is based on the consequent distinction between the well modelled kinematic world and the fuzzy real world together with the separation of the overall guidance problem in a steering problem and a feedback problem. The approach provides for insight in guidance law structures and information requirements as well as in the necessity and the potential benefit of applying modern control theory. Modern filtering and controller design techniques are reviewed for this purpose. The exemplified investigation of the two point and three point guidance principles shows the kinematic guidance law character of extended proportional navigation and of line-of-sight guidance and the possible improvement of system behavior by the application of modern control techniques. Author

N79-27231# Martin Marietta Corp., Orlando, Fla. Aerospace Div.

TESTING OF MISSILE GUIDANCE AND CONTROL SYSTEMS

Philip C. Gregory *In* AGARD Guidance and Control for Tactical Weapons with Emphasis on Simulation and Testing May 1979 15 p (For primary document see N79-27225 18-15)

Avail: NTIS HC A07/MF A01

A radar guidance laboratory which allows simultaneous infrared simulations for developing and testing point tracker radar and IR dual mode guidance systems is described. These guidance systems must be tested for target acquisition, discrimination, and tracking capabilities under precisely controlled conditions in a dynamic, real-time, simulated environment. The radar guidance types can be passive at 3 to 5 or 8 to 14 microns. A review of system requirements is furnished, and the major laboratory subsystems are described, with emphasis on the features of the rotational and translational motion systems, anechoic chamber, linear array target antenna system, radar generation system, IR target system, and computation. M.M.M.

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N79-27232*# Computer Sciences Corp., Houston, Tex. Applied Technology Div.
PRELIMINARY TREND MONITORING SYSTEM DATA MANAGER'S GUIDE Final Report
Lloyd Turberville and Don McCormick May 1979 91 p refs (Contract NAS9-15700)
(NASA-CR-160251; CSC-0286; JSC-14812) Avail: NTIS HC A05/MF A01 CSCL 22B

The functions and data base structures that the data base manager will be responsible for maintaining are documented. All normal and error sequences are included. J.M.S.

N79-27216# Messerschmidt-Boelkow G.m.b.H., Ottobrunn (West Germany).
NOISE ADAPTIVE FILTER
W. Wiemer *In* Von Karman Inst. for Fluid Dyn. Missile Aerodyn., Vol. 2 1974 53 p refs (For primary document see N79-27211 18-15)
Avail: NTIS HC A12/MF A01

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N79-27233*# Computer Sciences Corp., Houston, Tex. Applied Technology Div.
DRIVE PROGRAM DOCUMENTATION
Samuel Graham Apr. 1979 67 p refs (Contract NAS9-15700)
(NASA-CR-160252; CSC-0355) Avail: NTIS HC A04/MF A01 CSCL 17B

The program description and user's guide for the Downlist Requirement Integrated Verification and Evaluation (DRIVE) program is provided. The program is used to compare existing telemetry downlist files with updated downlist requirements.G.Y.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N79-27234*# General Dynamics/Convair, San Diego, Calif.
ATLAS 5013 TANK CORROSION TEST Final Report
W. M. Sutherland, L. D. Girton, and D. G. Treadway Dec. 1978 133 p refs
(Contract NAS3-20644)
(NASA-CR-158760; CASD-LVP-78-078) Avail: NTIS HC A07/MF A01 CSCL 22B

The type and cause of corrosion in spot welded joints were determined by X-ray and chemical analysis. Fatigue and static tests showed the degree of degradation of mechanical properties. The corrosion inhibiting effectiveness of WD-40 compound and required renewal period by exposing typical joint specimens were examined. M.M.M.

N79-27235*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HIGH VOLTAGE SURFACE-CHARGED ENVIRONMENT TEST RESULTS FROM SPACE FLIGHT AND GROUND SIMULATION EXPERIMENTS
Norman T. Grier 1979 13 p refs Presented at the High Voltage Workshop, Anaheim, Calif., 26-27 Feb. 1979; sponsored by the AIAA
(NASA-TM-79184; E-051) Avail: NTIS HC A02/MF A01 CSCL 10A

Surface-charged particle interactions were investigated for a small 100 sq cm conventionally constructed solar cell panel in ground facilities and in a flight experiment. The flight data substantiated preflight ground test results showing that at high positive biases the cover glass over each solar cell enhances the coupling current and that, at high negative biases, arcs create large transients in the coupling current. R.E.S.

N79-27236*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A THERMAL CONTROL APPROACH FOR A SOLAR ELECTRIC PROPULSION THRUST SUBSYSTEM
Joseph E. Maloy and Jon C. Oglebay Jun. 1979 22 p refs
(NASA-TM-79175; E-040) Avail: NTIS HC A02/MF A01 CSCL 21C

A thrust subsystem thermal control design is defined for a Solar Electric Propulsion System (SEPS) proposed for the comet Halley Flyby/comet Tempel 2 rendezvous mission. A 114 node analytic model, developed and coded on the systems improved numerical differencing analyzer program, was employed. A description of the resulting thrust subsystem thermal design is presented as well as a description of the analytic model and comparisons of the predicted temperature profiles for various SEPS thermal configurations that were generated using this model. It was concluded that: (1) a BIMOD engine system thermal design can be autonomous; (2) an independent thrust subsystem thermal design is feasible; (3) the interface module electronics temperatures can be controlled by a passive radiator and supplementary heaters; (4) maintaining heat pipes above the freezing point would require an additional 322 watts of supplementary heating power for the situation where no thrusters are operating; (5) insulation is required around the power processors, and between the interface module and the avionics module, as well as in those areas which may be subjected to solar heating; and (6) insulation behind the heat pipe radiators is not necessary. Author

N79-27237*# Martin Marietta Aerospace, Denver, Colo.
HANDBOOK ON ASTRONAUT CREW MOTION DISTURBANCES FOR CONTROL SYSTEM DESIGN
M. Conlon Kullas May 1979 196 p refs
(Contract NAS2-2982)
(NASA-RP-1025; L-12299) Avail: NTIS HC A09/MF A01

CSCL 22B

The analyses and results pertinent to the characterization of the disturbances imparted to the Skylab vehicle by the T-013 crew motion experiments are summarized. Guidelines to help control system designers assess anticipated crew motion disturbances during the design cycle of a new manned spacecraft control system are provided. These guidelines, in conjunction with the T-013 characterizations outlined, begin with the control system conceptual design and conclude with preliminary expectations for pointing performance as affected by crew motions. Block diagrams to highlight the contents so that the reader can easily identify the information and data flow are used. These diagrams provide a handy cross reference of related topics. S.E.S.

N79-27238# Aeritalia S.p.A., Torino (Italy).
SPACELAB FOLLOW-ON DEVELOPMENT: EXECUTIVE SUMMARY. HEAT REJECTION AUGMENTATION AND INCREASED CAPABILITY FOR THE SPACELAB LIQUID LOOPS
L. Bussolino and B. Sessions Paris ESA Sep. 1978 135 p
(Contract ESTEC-3557/78-F-HEW(SC))
(RP-AI-0239; ESA-CR(P)-1154) Avail: NTIS HC A07/MF A01

Different options are discussed and final choices are presented. The study leading up to these decisions is summarized. Detailed cost and work schedules for the areas studied are given. Volume I (Executive Summary) is supplemented by technical analyses documented in Volume II and by drawings/layouts compiled in Volume III which provide a physical description (where necessary) of the design concepts evaluated. Author (ESA)

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N79-27239# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Ballistic Research Lab.
RESPONSE OF A ROCKET MOTOR TO TRANSVERSE BLAST LOADING Final Report
Norris J. Huffington, Jr. and Henry L. Wisniewski Feb. 1979 52 p refs
(AD-A068464; AD-E430215; ARBRL-TR-02144) Avail: NTIS HC A04/MF A01 CSCL 21/8

The effects of propellant inertia and of internal pressurization on the structural response of solid propellant rocket motors subjected to transverse air blast loading have been investigated, both analytically and numerically. The numerical predictions were accomplished using the BRL versions of the PETROS 3.5 computer program, which employs the finite difference method to solve the equations governing finite amplitude elastoplastic response of thin shells. The response of a typical rocket motor configuration was calculated for the limiting situations of the bare motor case and of the motor case containing the complete propellant grain, each with no internal pressurization and with the pressurization resulting from propellant combustion. These calculations showed that the unpressurized motors experience a much larger deformation than the pressurized motors for the same blast loading. The most significant result is the quantification of the greater vulnerability of rocket motors prior to their ignition, whether on the launcher or as upper stages of in-flight missiles. GRA

N79-27240# Dornier-System G.m.b.H., Friedrichshafen (West Germany).
DESIGN, MANUFACTURING, AND TESTING OF SPACECRAFT THRUST CONE MADE OF CARBON FIBER REINFORCED PLASTIC (CFRP) Final Report
B. Caesar Nov. 1978 138 p refs
(Contract ESTEC-2929/76-NL-PP(SC))
(EMSB-79/78; ESA-CR(P)-1158) Avail: NTIS HC A07/MF A01

A satellite thrust cone made of CFRP compatible with GEOS interfaces was designed, analyzed and qualified by environmental tests. The analysis includes a comparision of different materials with the objective of weight minimization. GY70/95 prepregs were selected for manufacturing. The optimum design was found to be a corrugated cone. After successful qualification of the cone by sine vibration, acoustic noise, and static load tests, a static test to failure was performed. Test and analysis results are summarized and compared. Alternatives to the manufactured cone based on analytical results are presented. Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N79-27241*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PHOTOSENSITIZED OXIDATION OF UNSATURATED POLYMERS
Morton A. Golub Jun. 1979 22 p refs
(NASA-TM-78604; A-7891) Avail: NTIS HC A02/MF A01 CSCL 07C

The photosensitized oxidation or singlet oxygenation of unsaturated hydrocarbon polymers and of their model compounds was reviewed. Emphasis was on cis and trans forms of 1,4-polyisoprene, 1,4-polybutadiene and 1,2-poly(1,4-hexadiene), and on 1,4-poly(2,3-dimethyl-1,3-butadiene). The microstructural changes which occur in these polymers on reaction with O2-1 in solution were investigated by infrared H-1 and C-13 NMR spectroscopy. The polymers were shown to yield allylic hydroperoxides with shifted double bonds according to the ene mechanism established for simple olefins. The photosensitized oxidation of the above unsaturated polymer exhibited zero order kinetics, the relative rates paralleling the reactivities of the corresponding simple olefins towards O2-1. Author

N79-27242*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ELECTROCHEMICAL FLUORINATION OF TRICHLOROETHYLENE AND N, N-DIMETHYLTRIFLUOROACETAMIDE
Li-chen Hsu 1979 14 p refs Presented at the 155th Meeting of the Electrochem. Soc., Boston, 6-11 May 1979
(NASA-TM-79188; E-057) Avail: NTIS HC A02/MF A01 CSCL 07C

Fluorination of trichloroethylene and N, N-dimethyltrifluoroacetamide was carried out on a laboratory scale in an advanced Simons type electrochemical apparatus which could be operated automatically from ambient to 50 psi pressure. A variety of fluorine-substituted products are formed, depending upon electrolysis conditions and concentrations of reactant relative to the NaF, KF, HF electrolyte. A new reaction mechanism of electrochemical fluorination of trichloroethylene is proposed. The solvency-to-fluorine content relationship of fluorinated N, N-dimethyltrifluoroacetamide is described. Author

24 COMPOSITE MATERIALS

Includes laminates.

N79-27243*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF MOISTURE ON TORSION AND FLEXURE PROPERTIES OF GRAPHITE-EPOXY COMPOSITES
H. T. Sumsion and M. J. Adamson Jun. 1979 27 p refs
(NASA-TM-78597; A-7868) Avail: NTIS HC A02/MF A01 CSCL 11D

The effects of moisture and temperature on unidirectional and multi-ply laminates of T300/934 and AS/3501 graphite-epoxy systems were investigated. Properties studied were static flexure strength, and flexure and torsion fatigue strengths at room temperature and at 74 C. Specimens with increased moisture content showed a reduced static flexure strength; water as the test environment had only a negligible influence. In flexure fatigue and torsion fatigue, the water environment caused somewhat reduced fatigue strengths at room temperature and significantly greater degradation in 74 C water. The failure mode in all cases was interlaminar delamination. Author

N79-27244*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EFFECTS OF SPACE ENVIRONMENT ON COMPOSITES: AN ANALYTICAL STUDY OF CRITICAL EXPERIMENTAL PARAMETERS
A. Gupta, W. F. Carroll, and J. Moacanin 1 Jul. 1979 48 p refs
(Contract NAS7-100)
(NASA-CR-158767; JPL-Pub-79-47) Avail: NTIS HC A03/MF A01 CSCL 11D

A generalized methodology currently employed at JPL, was used to develop an analytical model for effects of high-energy electrons and interactions between electron and ultraviolet effects. Chemical kinetic concepts were applied in defining quantifiable parameters; the need for determining short-lived transient species and their concentration was demonstrated. The results demonstrates a systematic and cost-effective means of addressing the issues and show qualitative and quantitative, applicable relationships between space radiation and simulation parameters. An equally important result is identification of critical initial experiments necessary to further clarify the relationships. Topics discussed include facility and test design; rastered vs. diffuse continuous e-beam; valid acceleration level; simultaneous vs. sequential exposure to different types of radiation; and interruption of test continuity. A.R.H.

N79-27245*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL AND ANALYTICAL STUDY OF FATIGUE DAMAGE IN NOTCHED GRAPHITE/EPOXY LAMINATES
John D. Whitcomb Jun. 1979 31 p refs Presented at the ASTM Symp. on the Fatigue of Fibrous Composite Mater., San Francisco, 22-23 May 1979
(NASA-TM-80121) Avail: NTIS HC A03/MF A01 CSCL 11D

Both tension and compression fatigue behaviors were investigated in four notched graphite/epoxy laminates. After fatigue loading, specimens were examined for damage type and location using visual inspection, light microscopy, scanning electron microscopy, ultrasonic C-scans, and X-radiography. Delamination and ply cracking were found to be the dominant types of fatigue damage. In general, ply cracks did not propagate into adjacent plies of differing fiber orientation. To help understand the varied fatigue observations, the interlaminar stress distribution was calculated with finite element analysis for the regions around the hole and along the straight free edge. Comparison of observed delamination locations with the calculated stresses indicated that both interlaminar shear and peel stresses must be considered when predicting delamination. The effects of the fatigue cycling on residual strength and stiffness were measured for some specimens of each laminate type. Fatigue loading generally caused only small stiffness losses. In all cases, residual strengths were greater than or equal to the virgin strengths. A.R.H.

N79-27246*# Lockheed-California Co., Burbank.
FLIGHT SERVICE EVALUATION OF KEVLAR-49 EPOXY COMPOSITE PANELS IN WIDE-BODIED COMMERCIAL TRANSPORT AIRCRAFT Annual Flight Service Report, Jan. 1978 - Dec. 1978
R. H. Stone Mar. 1979 36 p refs
(Contract NAS1-11621)
(NASA-CR-159071; AR-5) Avail: NTIS HC A03/MF A01 CSCL 11D

Kevlar-49 fairing panels, installed as flight service components on three L-1011s, were inspected after five years' service. There are six Kevlar-49 panels on each aircraft: a left-hand and right-hand set of a wing-body sandwich fairing; a solid laminate under-wing fillet panel; and a 150 C (300 F) service aft engine fairing. The fairings have accumulated a total of 40,534 hours, with one ship set having 16,091 hours service as of Feb. 11, 1979. The Kevlar-49 components were found to be performing satisfactorily in service with no major problems, or any condition requiring corrective action. The only defects noted were minor impact damage, and a minor degree of fastener hole fraying and elongation. These are for the most part comparable to damage noted on fiberglass fairings. A.R.H.

N79-27247# Cambridge Univ. (England). Dept. of Engineering.
FRACTURE MECHANISMS IN FIBROUS COMPOSITES Interim Report, 1 Aug. 1978 - 31 Jan. 1979
Peter W. R. Beaumont 31 Jan. 1979 41 p refs
(Grant AF-AFOSR-3644-78)
(AD-A067965; AFOSR-79-0489TR) Avail: NTIS HC A03/MF A01 CSCL 11/4

This interim report summarizes the progress made in the period 1 Aug. 78 - 31 Jan. 79, under grant AFOSR 78-3644 entitled 'Fracture Mechanisms in Fibrous Composites. It describes microscopic observations of the debonding, fracture and pull-out of glass fibers and carbon fibers in an epoxy resin; includes a fractographic analysis of glass fibers and carbon fibers in epoxy resin; and an analysis of work of fracture (toughness) in terms of fiber-matrix sliding processes and the dissipation of energy when a debonded fiber snaps. All experimental data was collected under ambient conditions. The approach has been to use models with experimental values for those parameters adequately measurable and to make simple assumptions about the unmeasurable parameters. This approach uses the most that a model-based theory has to offer and provides a reasonable description of experimental data. Author (GRA)

N79-27248# Air Force Materials Lab., Wright-Patterson AFB, Ohio.
INTRODUCTION TO COMPOSITE MATERIALS. VOLUME 1: DEFORMATION OF UNIDIRECTIONAL AND LAMINATED COMPOSITES Interim Report, 1 Mar. 1978 - 1 Dec. 1978
Stephen W. Tsai and H. Thomas Hahn Jan. 1979 200 p
(AF Proj. 2419)
(AD-A067544; AFML-TR-78-201-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 11/4

This volume is intended to provide the basic derivations of equations needed for the elastic behavior of unidirectional and laminated composites. The modulus and compliance as functions of ply properties, angle of orientations, and stacking sequence of facing materials are all derived and shown in matrix multiplication tables. The only prerequisite for this volume is a course in strength of materials. All derivations are done in algebra. Matrix and tensor operations are not used. Numerical examples are provided to illustrate the equations and their applications. Author (GRA)

N79-27249# General Dynamics/Pomona, Calif.
FOAM-FILLED FIBERGLASS RADOMES Final Report, Jun. 1977 - Jul. 1978
William L. Macturk 16 Mar. 1979 253 p
(Contract N66001-77-C-0139)
(AD-A068672; M-24-6-678; NAVSEA-MT-100; NOSC/TR-395) Avail: NTIS HC A12/MF A01 CSCL 11/5

The work contained in this report details the activities accomplished from June of 1977 to July of 1978 on the manufacturing process development of a 40 in. diameter foam filled fiberglass radome by the Advanced Manufacturing Technol-

ogy Section at General Dynamics, Pomona Division. The Navy Phalanx Ship/Gun System now under production at General Dynamics, Pomona, which utilizes a 40 in. diameter hemispherical radome window as the enclosure for the search antenna unit, has adopted the fabrication process demonstrated in this program. This final report also contains the Test Plan and Results on the testing of this radome as concurred by NOSC, San Diego, and Manufacturing Technology, General Dynamics, Pomona. Test results appear as appendices at the end of report with the appropriate organization group at General Dynamics who conducted the tests so designated. A development Process Specification (D.P.S) detailing the manufacturing steps pursued in the construction of the radome is also appended to this final report along with vendor information as to the materials employed in the foam/fiberglass construction of this radome window. GRA

N79-27250# Oak Ridge National Lab., Tenn. Solid State Div.
EFFECT OF THERMAL ANNEALING IN BORON IMPLANTED, LASER ANNEALED SILICON
J. Narayan, B. C. Larson, and W. H. Christie Dec. 1978 7 p refs Presented at AIP Conf. on Laser-Solid Interactions and Laser Process, Boston, 28 Nov. - 1 Dec. 1978
(Contract W-7405-eng-26)
(CONF-781167-5) Avail: NTIS HC A02/MF A01

Electron microscopy and X-ray techniques were used to investigate dislocation generation, precipitation of dopants and intrinsic defects, and the relaxation of unidirectional strains after thermal annealing of boron implanted laser annealed silicon. It is shown that the number density of dislocations created near the interface after thermal annealing is small and therefore the unidirectional nature of the contraction in the dopes layer is essentially retained. A small number density of defect clusters (mostly vacancy dislocation loops, average size 20A) was observed after thermal annealing at 1000 C. Boron depth profile changes, as determined by secondary ion mass spectroscopy, indicated an increase in boron concentration near the surface in addition to the expected broadening of profiles after thermal annealing. DOE

N79-27251# Carborundum Co., Niagara Falls, N. Y.
HIGH TEMPERATURE PROPERTIES OF SINTERED ALPHA SILICON CARBIDE
J. A. Coppola, M. Srinivasan, K. T. Faber, and R. H. Smoak Oct. 1978 24 p refs Presented at the Intern. Symp. on Factors in Densification and Sintering of Non-Oxide Ceramics, Hakone, Japan, 3-6 Oct. 1978
(Contract EF-77-C-01-2664)
(CONF-7810129-2) Avail: NTIS HC A02/MF A01

The oxidation behavior of sintered alpha SiC is parabolic at 1200 C, 1350 C and during the initial stages at 1500 C. Parabolic rate constants were calculated and show values lower than for hot pressed SiC but consistent with other forms of sintered SiC. Time dependent failure does occur in sintered alpha SiC in air at temperatures above 1400 C but appears to be stress level dependent. Slow crack growth does occur in sintered alpha SiC and appears to be related to grain boundary oxidation. Increases in fast fracture strength and K/sub Ic/ can be realized by oxidation. DOE

N79-27252# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
USER MANUALS FOR THREE COMPUTER PROGRAMS FOR ANALYSIS OF COMPOSITE MATERIALS (LOPT, SOPT, SOC)
Lennart Knutsson Nov. 1978 41 p refs
(Contract FMV-FFL-82223-77-001-21-001)
(FFA-TN-HU-2054) Avail: NTIS HC A03/MF A01

Input and output of computer programs are described. These programs are LOPT (minimum weight design of fiber reinforced plastic materials), SOPT (minimum weight design of orthotropic sandwich panels), and SOC (Multilinear analysis of laminates). Author (ESA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N79-27253 California Univ., Berkeley.
THERMAL RATE CONSTANTS, ENERGY DEPENDENCE AND ISOTOPE EFFECT FOR LASER INITIATED HALOGEN-HYDROGENHALIDE REACTIONS Ph.D. Thesis
Chang-Chi Mei 1978 143 p
Avail: Univ. Microfilms Order No. 7914694

The laser initiated chemical reaction method was used to determine the thermal reaction rate constants for the reactions Y + HX yields HY(v = or > 0) + X, Y = Cl or Br and X = Br or I, in the temperature range 220 - 400 K. The Y atoms are produced by Y2 photolysis. The reaction rates vary slowly with temperature. For Cl + HI the effective cross section reaches a maximum of 31 sq A near 300 K. For Cl + HBr, although no maximum is observed within the limited temperature range, the rate is increasing much less rapidly at high temperature than at low temperature. For Br + HI, the cross section decreases slightly with increasing temperature. The dependence of the rate on reagent translational, rotational energy and H-D substitution for the reaction Cl + HI is discussed. Dissert. Abstr.

N79-27254 California Univ., Berkeley.
THE CALCULATION OF AUTOIONIZATION POSITIONS AND WIDTHS WITH APPLICATIONS TO PENNING IONIZATION REACTIONS Ph.D. Thesis
Alan David Isaacson 1978 154 p
Avail: Univ. Microfilms Order No. 791646

The configuration interaction potential energy and width surfaces for the He(2(3)S)+H2 system were obtained. Quantum mechanical close coupling calculations of ionization cross sections yields rate constants in good agreement with the experimental results. The potential energy surface of the He(2(1)S)+H2 system was also obtained, and exhibited not only a high degree of anisotropy, but also a relative maximum for a perpendicular approach which appears to arise from s-p hybridization of the outer He orbital. In addition, the complex poles of the S matrix (Siegert eigenvalues) were calculated for several autoinizing states of He and H(-), with encouraging results even for quite modest basis sets. This method was extended to molecular problems, and results were obtained for the He(2(3)S)+H and He(2(1)S)+H Dissert. Abstr.

N79-27255 Illinois Univ. at Chicago Circle, Chicago.
A VIBRATIONAL BIAS MECHANISM FOR DIATOMIC DISSOCIATION: INDUCTION TIMES, STEADY RATES, AND ACTIVATION ENERGIES Ph.D. Thesis
Jean-Christophe Joseph Hajduk 1979 158 p
Avail: Univ. Microfilms Order No. 7916374

A vibrational bias mechanism is presented for the dissociation of O2, H2, and D2 dilute in argon. Instantaneous rotational equilibrium and infinitely dilute mixtures, i.e., linear kinetics, are assumed throughout. The inadequacy of simple models allowing dissociation from the topmost vibrational level only is demonstrated. The rate constants generated from the quasi-classical trajectory study for H2-Ar are employed for predicting thermal observables, i.e., steady rate, relaxation time, and induction time. The trajectory results suggest a nonequilibrium rotational distribution during steady-state dissociation in He, and also indicate a flexible bias form for the level-to-continuum dissociation rates. This vibrational bias form is also shown to be derivable from information theoretic considerations. Dissert. Abstr.

N79-27256 California Univ., Los Angeles.
KINETICS AND MAGNETIC FIELD EFFECTS ON LASER INDUCED FLUORESCENCE IN NO2 Ph.D. Thesis
Gary Raymond Gust 1978 218 p
Avail: Univ. Microfilms Order No. 7915663

The behavior of the fluroescence emission from low pressure gas phase NO2 excited in the Douglas-Huber 2B1 rotational

band at 455 nm by a pulsed tunable laser was studied. Undispersed fluorescence and fluorescence from single resonance emission lines were observed at a range of pressures from 10 to 200 millitorr and the collisional quenching cross sections and zero pressure decay lifetimes determined. The signal from the undispersed fluorescence was found to contain an exponential rise component that indicates energy is transferred in an intramolecular radiationless transition from the originally excited level to an intermediate nonradiating level and then to the radiating 2B2/2A1 manifold. The effect of a static, external magnetic field on the resonance fluorescence was also studied. Two exponential decay components were observed in the resonance fluorescence signal. Dissert. Abstr.

N79-27257 Johns Hopkins Univ., Baltimore, Md.
MASS SPECTROMETRIC STUDIES OF SOME IONS Ph.D. Thesis
Louis Charles Frees 1978 151 p
Avail: Univ. Microfilms Order No. 7914288

The existence of gaseous doubly charged negative ions using three different types of ion sources were studied. Both a Cs(+) sputtering ion source and a small Penning source gave no evidence of any doubly charged negative ions. Both these instruments used radio frequency quadrupole mass filters to identify the ion mass to charge ratios. Dissert. Abstr.

N79-27258 Wisconsin Univ. - Madison.
ACIDITY DISTRIBUTION ON OXIDE SURFACES Ph.D. Thesis
Michel Deeba 1978 219 p
Avail: Univ. Microfilms Order No. 7916098

A new method for measuring acidity distribution was developed, using pyridine as an adsorbent and a series of Hammett indicators. The catalysts were saturated with pyridine at room temperature. The pyridine was then desorbed into flowing helium at successively higher temperatures (25-400 C). In this way, the weakest sites were depopulated first and so on. When desorption was complete at each temperature, the surface acidity was assayed with Hammett indicators. At the same time, equilibrium heats of adsorption were measured and energies of activation for pyridine desorption. We were thus able to measure the number of acid sites of a particular acid strength and the corresponding adsorption energy. Dissert. Abstr.

N79-27259 Johns Hopkins Univ., Baltimore, Md.
PIECEWISE POLYNOMIAL CONFIGURATION INTERACTION NATURAL ORBITAL STUDY OF 1s2 HELIUM Ph.D. Thesis
Dennis Paul Carroll 1979 126 p
Avail: Univ. Microfilms Order No. 7914276

An analysis of extensive configuration interaction calculations on the ground state of helium using piecewise polynomial basis functions is presented. Large numbers of natural radial orbitals (NROs) were systematically analyzed. The contribution of each NRO to the total energy was found. The expansion coefficient of the NRO configuration was also found. The shapes of the NRO were found to behave in a systematic way. Dissert. Abstr.

N79-27260 California Inst. of Tech., Pasadena.
OXY ANION-ACCELERATED REARRANGEMENTS Ph.D. Thesis
David Joseph Baillargeon 1979 309 p
Avail: Univ. Microfilms Order No. 7915591

The alkali metals salts of 1,5-hexadien-3-ols undergo accelerated Cope rearrangements to the enolates of delta epsilon unsaturated carbonyl compounds. The generality of the rearrangement was investigated in numerous systems, particularly acyclic cases, and the effect of changes in substituents counterions, solvents, and geometrical structures were noted and discussed. Applications of this methodology in synthesis included the synthesis of the insect pheromone frontalin, the preparation of selectively monoprotected 1,6-dicarbonyl compounds from 4-methoxy-and 4-phenylthio-1,5-hexadien-3-ols, and the construction of complex ring structures such as a D-homoestratetraenone derivative. Thermochemical estimates of the energetics of anion-promoted alkoxide fragmentations were made, and in all cases heterolytic cleavage was favored over homolytic cleavage by 8.5-53 kcal/mol. The implication of these thermochemical estimates is that the anionic oxy-Cop rearrangement occurs via a concerted mechanism rather than a dissociation recombination process. Dissert. Abstr.

N79-27261 California Univ., Berkeley.
THE OXIDIZING BEHAVIOR OF SOME PLATINUM METAL FLUORIDES Ph.D. Thesis
Lionell Graham 1978 96 p
Avail: Univ. Microfilms Order No. 7914820

A Xe:PtF6 material of approximately 1:1 stoichiometry was prepared and compared with XePdF6(XeF2)(PdF4). The interaction of chlorine with the third-series transition metal hexafluorides was investigated. Gravimetric and tensimetric evidence indicates that the initial product of the Cl2 plus IrF6 reaction is a solid of composition Cl2IrF6. Vibrational spectroscopic and other evidence indicates that this solid yields a sequence of products, of which Cl3(+)IrF6(-),Cl(+)- Ir2F11(-) and Ir4F20 were identified, the last being the ultimate solid product of the room temperature decomposition of the adduct. Infrared evidence for a new chlorine fluoride generated in the room temperature decomposition of Cl2IrF6 was tentatively formulated as ClF3. Dissert. Abstr.

N79-27262 Illinois Univ. at Urbana-Champaign.
INTERVALENCE ELECTRON TRANSFER IN MIXED-VALENCE COMPOUNDS Ph.D. Thesis
Bruce Conrad Bunker 1979 217 p
Avail: Univ. Microfilms Order No. 7915327

Experiments aimed at understanding the energetics and rates of intervalence electron transfer in a number of mixed-valence compounds were undertaken to test current theories of electron transfer. Part of the research effort was directed at studying mixed-valence compounds which show behavior indicative of a breakdown such as the [2,3], oxidation state of the dimer mu-pyrazinebis(pentaammineruthenium) tosylate. Experiments were conducted to help formulate a description for the molecular orbitals involved in the electron transfer and to determine the rate of intervalence electron transfer between the two metal centers in the dimer. The other part of the research on mixed-valence compounds focused on trying to develop better experimental techniques for studying the intervalence transfer phenomenon. The technique investigated most extensively was time domain reflectometry. Dissert. Abstr.

N79-27263 Illinois Univ. at Urbana-Champaign.
MAGNETIC EXCHANGE INTERACTIONS IN COPPER(II) COMPLEXES PROPAGATED BY EXTENDED BRIDGING GROUPS Ph.D. Thesis
Timothy Roy Felthouse 1978 531 p
Avail: Univ. Microfilms Order No. 7913450

The preparation and magnetic properties are reported for a series of complexes having the general formula [Cu2(dien)2(X) sub 2] (Y) sub 2, where dien is diethylenetriamine, dipropylenetriamine,1,1,4,7,7-pentamethyldiethylenetriamine, or 1,1,4,7,7-pentaethyldiethylenetriamine, X(-) is variously C2O4(2-)/2, C4O4(2-)/2, C4H4O4(2-)/2, C3H2O4(2-)/2, N3(-), NCO(-), NCS(-), Cl(-), Br(-), or OH(-), and Y(-) represents BPh4(-), ClO4(-), or PF6(-). Variable-temperature magnetic susceptibility and EPR data are presented which indicates that the exchange parameter is much greater for those complexes having a trigonal bipyramidal geometry about the copper(2) ion and hence a d sub z2 ground state. The magnetic properties are also reported for copper(2) complexes with oxamide and cyclo-L-histidyl-L-histidyl binucleating ligands as well as polymeric copper(2) complexes with methionine and citrate ligands. Dissert. Abstr.

N79-27264 California Univ., Berkeley.
BONDING IN INORGANIC COMPOUNDS: A STUDY BY X-RAY PHOTOELECTRON SPECTROSCOPY Ph.D. Thesis
Steven Charles Avanzino 1978 77 p
Avail: Univ. Microfilms Order No. 7914533

Core electron binding energies were measured for a variety of inorganic and organometallic compounds using gas-phase X-ray photoelectron spectroscopy (XPS). The atomic charge distributions in these molecules are deduced from the binding energies, often leading to a better understanding of the bonding in these compounds. The XPS spectra of fifteen volatile tin

compounds were recorded. The oxygen 1s XPS spectra of gaseous CH3,Mn(CO)5,[piC5H5Fe(CO)2]2, and Co4(CO)12 can be readily resolved into separate peaks due to bridging and terminal carbonyl groups. High-quality X-ray photoelectron spectra were obtained for compounds dissolved in glycerin solutions, and aqueous solutions were converted into glycerin solutions which gave good XPS spectra of the solutes. The technique appears promising as a future analytical application of X-ray photoelectron spectroscopy. The shifts in the binding energies of oxygen, chlorine, and carbon atoms in some isoelectronic isostructural compounds can be explained in terms of simple trends in atomic charges.
Dissert. Abstr.

N79-27265 North Carolina Univ. at Chapel Hill.
APPLICATION OF CURVE-FITTING TO X-RAY PHOTOELECTRON SPECTROSCOPY AND CYCLIC VOLTAMMETRY Ph.D. Thesis
David Fuller Smith 1978 158 p
Avail: Univ. Microfilms Order No. 7914407

The mathematical procedure known as nonlinear residual least squares curve fitting is introduced. Application of curve fitting to the decomposition of X-ray photoelectron (ESCA) spectra, including the fitting of sigmoid curves to the nonlinear baseline arising from inelasticity scattered electrons, is presented. The program ESCAFIT, which performs least squares curve-fitting of ESCA data sets, is described. A comparison of simplex curve fitting with the least squares method reveals that the former, while simpler than the latter mathematically, nonetheless requires much longer to converge and needs better initial values for the variable parameters. Finally, curve fitting is employed to study the potential sweep voltammetric behavior of molecules covalently attached to electrode surfaces, using equations derived from a theory relating surface activities to intermolecular interactions.
Dissert. Abstr.

N79-27266 Iowa State Univ. of Science and Technology, Ames.
X-RAY EXCITED OPTICAL LUMINESCENCE OF POLYNUCLEAR AROMATIC HYDROCARBONS Ph.D. Thesis
Gregory Joseph Oestreich 1979 161 p
Avail: Univ. Microfilms Order No. 7916208

X-ray excited optical luminescence (XEOL) coupled with time resolved spectroscopy was employed to analyze polynuclear aromatic hydrocarbons (PAH) in n-alkane solvents at 10 K. A pulsed XEOL system which was designed around minicomputer control of a medical X-ray unit was developed. Computer software which generated variable width X-ray pulses, monitored timing reference pulses, controlled data acquisition and analyzed data was written. Phosphorescence decay constants of several PAHs were determined. Synthetic mixtures of zone refined PAHs were prepared and time resolved with the pulsed XEOL technique. Analytical results obtained from the five component mixtures of PAHs at the part per million level were tabulated. Systematic improvements and further development of the pulsed XEOL method were considered.
Dissert. Abstr.

N79-27267 Purdue Univ., Lafayette, Ind.
NEW INSTRUMENTAL, MATHEMATICAL, AND CHEMICAL DEVELOPMENTS FOR KINETIC METHODS OF ANALYSIS Ph.D. Thesis
Glen Edward Mieling 1978 162 p
Avail: Univ. Microfilms Order No. 7914930

The development and evaluation of a fully automated hierarchical computer controlled stopped flow spectrophotometer and reagent preparation unit are described. A mini and a microcomputer can be used effectively in a hierarchical arrangement for both routine and nonroutine types of kinetic and equilibrium experiments. The application of the computer controlled stopped flow system for a kinetic study of the Fe(III)-thiocyanate reaction is presented as well as an approach to first order kinetic analysis that is insensitive to variables such as temperature, pH and enzyme activity that influence rate constants. A kinetic method for the determination of glucose based upon the coupled hexokinase/glucose-6-phosphate dehydrogenase enzyme reactions is examined.
Dissert. Abstr.

N79-27268 North Carolina Univ. at Chapel Hill.
TRANSPORT STUDIES OF ION EXCHANGE MEMBRANES Ph.D. Thesis
Dale Edwin Mathis 1978 214 p
Avail: Univ. Microfilms Order No. 7914383

Impedance measurements were made on purified silver chloride single crystals covering the thicknesses from 0.064 cm to 0.400 cm at temperatures from 293 K to 310 K using constant ionic strength solution contacts with varying silver ion concentrations. Results characterize the macroscopic transport properties from 10 KHz to 0.01 Hz and at DC. Electrical relaxation times were independent of crystal thickness and bathing solution composition, but were dependent on temperature. The resistive component of the impedance was linear with crystal thickness and the geometric capacitance varied inversely with thickness. A controlled-thickness thin layer cell with blocking contacts was used to measure impedances of ion transport in free liquid and supported ion exchange membranes.
Dissert. Abstr.

N79-27269 Rhode Island Univ., Kingston.
THE IDENTIFICATION AND QUANTITATION OF UV ABSORBING COMPOUNDS IN SERUM BY REVERSED-PHASE HIGH PERFORMANCE LIQUID CHROMATOGRAPHY Ph.D. Thesis
Richard Allen Hartwick 1978 254 p
Avail: Univ. Microfilms Order No. 7915458

Analytical procedures involving high-performance liquid chromatography (HPLC) were developed and refined for the determination of the profiles of UV absorbing compounds in normal serum. The optimization of chromatographic conditions was investigated to develop the separation of the nucleosides, bases and aromatic amino acids found in human serum. Sample preparation techniques were explored. Ultrafiltration proved to be compatible with the extremely sensitive (picomole) analyses desired. Preliminary investigations involving the sera of patients suffering from several types of cancer were investigated, and were found to be significantly different from the normal profiles. In addition, an HPLC assay for the enzyme adenosine deaminase was developed and evaluated.
Dissert. Abstr.

N79-27270 North Carolina Univ. at Chapel Hill.
FIELD EFFECT ION SELECTIVITY, PART 1. ELECTROCHEMICAL NOISE, PART 2 Ph.D. Thesis
David Eugene Hackleman 1978 454 p
Avail: Univ. Microfilms Order No. 7914355

A theoretical and experimental study of Ion Selective Electrodes (ISE's) which use electric fields rather than electric currents as the communication link between the solution species and the detection apparatus is presented. The principles of their sensitivity and selectivity are discussed through electrochemical potential and Fermi level approaches. Experimental studies were made on the effects of composition and thickness of the insulating layer which the electric field passes through, and the thickness of the ion sensing material. An experimental and theoretical study of voltage fluctuations in electrochemical cells and their relation to impedance-frequency responses is presented. The experimental system involves cross-correlation of digitized data from two independent measurements of the voltage fluctuations of a single electrode. A detailed description is given, including testing methods.
Dissert. Abstr.

N79-27271 Duke Univ., Durham, N. C.
A SYSTEMATIC APPROACH TO OPEN TUBULAR COLUMN GAS-CHROMATOGRAPHIC INSTRUMENTATION Ph.D. Thesis
Bert Miller Gordon 1978 137 p
Avail: Univ. Microfilms Order No. 7915578

The design of thermal conductivity detectors for open tubular column gas chromatography was systematically investigated with the aid of modern digital data acquisition techniques. Two important factors in such a design are sensitivity and peak broadening. The latter factor was the principal thrust in this work and contributions to peak shape from both cell volume were analyzed by the method of statistical moments. The chromatographic peak variance was shown to correlate directly with cell volume for detectors of the same design but both peak variance and peak asymmetry were found to be design dependent. The carrier gas flow rate dependence of the inlet and detector contributions to the volumetrically based peak variance was investigated. A mathematical relation was developed from experimental data indicating that at high volumetric flow

rates, the limiting factor in extra-column band broadening is the inlet volume. Dissert. Abstr.

N79-27272 North Carolina Univ. at Chapel Hill.
THEORY OF INTERFACIAL AND CHARGE TRANSPORT PHENOMENA IN MEMBRANE ELECTROCHEMISTRY Ph.D. Thesis
Timothy Robert Brumleve 1978 266 p
Avail: Univ. Microfilms Order No. 7914326

The technique of digital simulation was employed in the solution of the Nernst-Planck and Poisson equations for the extraction of a salt M(+)X(-) into a membrane phase. Steady state solutions, transient responses, and impedance-frequency responses are presented for a number of examples from the fields of membrane electrochemistry and solid state physics. The small signal electrical response of conducting membranes and electrochemical cells was modelled in an intuitive and instructive fashion by analogy with trans nission line equivalent circuits consisting of distributed resistive and capacitive elements. It is shown that the solution of the transmission line equations with fixed components is equivalent to solution of the linearized Nernst-Planck and Poisson equation system under the equilibrium conditions. Dissert. Abstr.

N79-27273 Alabama Univ., University.
MULTIDIMENSIONAL HIGH RESOLUTION GAS LIQUID CHROMATOGRAPHY IN TRACE ORGANIC ANALYSIS: HEARTCUTTING WITH INTERMEDIATE TRAPPING Ph.D. Thesis
Edwin Lee Anderson 1979 255 p
Avail: Univ. Microfilms Order No. 7915008

Analytical instrumentation capable of resolving extremely complex environmental samples by gas chromatography was developed. Two gas chromatographs were combined into one unit, integrated by a common manifold flow system. The instrument allows valveless switching of a compound or group of compounds from the first GC into the second GC for further resolution. The unit was designed for high resolution glass capillary columns and parallel selective detectors in the heartcutting mode. The performance of individual instrumental components was critically evaluated with the aid of a small computer. Operational parameters were investigated over a wide range and are reported. A few practical examples are shown. Dissert. Abstr.

N79-27274 California Univ., Berkeley.
LASER PHOTOCHEMICAL REACTION DYNAMICS IN FORMALDEHYDE Ph.D. Thesis
Muhammad Bari Ahmad Zughul 1978 234 p
Avail: Univ. Microfilms Order No. 7914830

Appearance ratio constants of molecular photochemical products were measured following laser photolysis of formaldehyde in the near ultraviolet. The pressure dependence of appearance rates was studied for three formaldehyde isotopic species, namely: H2CO, HDCO, and D2CO. The effect of added foreign gases on those rates in H2CO was determined for He, Ar, Xe, and NO. The energy dependence of photo-dissociation rates was examined following laser photolysis at 354.7 and 299.1 nm. The decay rates of CO(v=1) were measured for several collision partners including H2CO, HDCO, acrolein, ketene, cis-2-butene, and cyclobutanone. The measurement of appearance rates for the radical dissociation channel in formaldehyde by monitoring H-atom production was attempted using resonance fluorescence, resonance absorption, and two-photon excited fluorescence of hydrogen Lyman alpha photons. Dissert. Abstr.

N79-27275 California Univ., San Diego.
LABORATORY ANALOGUES TO COSMIC DUST Ph.D. Thesis
John Robert Stephens 1979 316 p
Avail: Univ. Microfilms Order No. 7915644

An experimental study is presented dealing with the condensation of refractory solids in various atmospheres. Solid targets of metals and dielectrics, and targets composed of mixed powers were vaporized in reducing inert, and oxidizing atmospheres. The laser-target interactions, vapor expansion, and condensation are studied by time resolved schlieren and streak photography and emission spectroscopy. The chemical composition, diffracting structure, size, and morphology of the collected condensates were analyzed by electron microscopy and electron microprobe analysis. Infrared emission and absorption spectra as well as visible and ultraviolet absorption spectra of selected samples were obtained. Dissert. Abstr.

N79-27276# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
COMBUSTION
Mar. 1970 211 p refs Lecture held at Rhode-Saint-Genese, Belgium, 9-13 Mar. 1970
(VKI-Lecture-Series-22) Avail: NTIS HC A10/MF A01

Fundamental concepts of combustion and fluid dynamics are presented. For individual titles, see N79-27277 through N79-27278.

N79-27277# Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
THE BASIC EQUATIONS
D. B. Spalding and S. J. Peerless *In* Von Karman Inst. for Fluid Dyn. Combust. Mar. 1970 46 p refs (For primary document see N79-27276 18-25)
Avail: NTIS HC A10/MF A01

Basic equations pertaining to combustion and fluid dynamics are presented. Other topics discussed include: (1) the finite difference theory, (2) flow boundaries, (3) confined flows, and (4) computer programs applicable to combustion dynamics. R.E.S.

N79-27278# Sheffield Univ. (England). Dept. of Fuel Technology and Chemical Engineering.
COMBUSTION FUNDAMENTALS
J. Swithenbank *In* Von Karman Inst. for Fluid Dyn. Combust. Mar. 1970 163 p refs (For primary document see N79-27276 18-25)
Avail: NTIS HC A10/MF A01

Combustion physics concepts are presented. Topics discussed include: (1) flow equations, (2) heat addition to real and ideal gas, (3) premixed flames and diffusion flames, (4) turbulence, (5) stirred reactors, (6) burner design, (7) supersonic combustion, and (8) combustion noise. R.E.S.

N79-27279*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MASS SPECTROMETRIC INVESTIGATION OF THE VAPORIZATION OF SODIUM AND POTASSIUM CHROMATES: PRELIMINARY RESULTS
Carl A. Stearns, Fred J. Kohl, Robert A. Miller, and George C. Fryburg 1979 16 p refs Presented at the 8th Midwest High Temp. Chem. Conf., Milwaukee, 3-6 Jun. 1979
(NASA-TM-79210; E-095) Avail: NTIS HC A02/MF A01

Knudsen cell mass spectrometry was used to study the vaporization of sodium and potassium chromates. For both salts, the vaporization proceeds predominately by the reactions M2CrO4(c)=2M(g)+5/4O2(g)+1/2 Cr2O3(s) and M2CrO4(c)=M2CrO4(g) where M = Na or K. The distribution of the ions M(+), O2(+) and M2CrO4(+) in the measured mass spectrum was found to depend on the material used for the Knudsen cell, even for materials such as platinum and gold. In the case of sodium chromate, the decomposition reaction appears to be less important than the molecular vaporization reaction. A preliminary value of 72 kcal/mole at 1141 K was measured for the heat of the molecular vaporization reaction for sodium chromate. In the case of potassium chromate, it has not been possible to conclude which mode of vaporization dominates. For potassium chromate a value of 101 kcal/mole at 1173 K was obtained for the heat of the molecular vaporization reaction. Author

N79-27280# Air Force Academy, Colo. Frank J. Seiler Research Lab.
MEASUREMENT OF TRANSPORT PROPERTIES OF SEVERAL N-ALKYLPYRIDINIUM HALIDES AND THEIR MIXTURES WITH ALUMINUM CHLORIDE
Ronald A. Carpio, Lowell A. King, Richard E. Lindstrom, John C. Nardi, and Charles L. Hussey Dec. 1978 19 p refs
(AD-A067763; FJSRL-TR-78-0014) Avail: NTIS HC A02/MF A01 CSCL 07/3

The specific conductivities of molten N-methyl-, N-ethyl-,

N-(n-propyl)-, and N-(n-butyl)pyridinium chlorides and N-ethylpyridinium bromide were measured from near the melting points to the thermal decomposition temperatures. Conductivities also were measured from 25 C to 125 C for mixtures of each of these compounds with aluminum chloride. The composition of the mixtures was 1:2 N-alkylpyridinium halide-AlCl3. In addition, the equimolar melt 1:1 N-ethylpyridinium chloride-AlCl3 was investigated. Densities and viscosities were measured and equivalent conductivities calculated for each of the 1:2 melts.
Author (GRA)

N79-27281# Illinois Univ. at Urbana-Champaign. Dept. of Chemistry.
CHEMILUMINESCENCE OF DIMETHYLDIOXETANE: UNIMOLECULAR GENERATION OF EXCITED SINGLET AND TRIPLET ACETONE. CHEMICALLY INITIATED ELECTRON-EXCHANGE LUMINESCENCE, THE PRIMARY LIGHT GENERATING REACTION
Gary B. Schuster and Steven P. Schmidt May 1979 47 p Submitted for publication
(Contract N00014-76-C-0745; NR Proj. 051-616)
(AD-A068920) Avail: NTIS HC A03/MF A01 CSCL 07/3

Dimethyldioxetanone (2a) undergoes two distinct thermal reactions which generate electronically excited states. The unimolecular decomposition of 2a at 30.0 C produces excited singlet and triplet acetone, with efficiencies of 0.1 and 1.5% respectively. The composite activation energy for formation of singlet acetone is 3-4 kcal/mol greater than the activation energy for the thermal disappearance of 2a. This result is interpreted in terms of two parallel competitive pathways for dioxetanone decomposition, the more highly activated one of which leads to excited acetone. The addition of easily oxidized aromatic hydrocarbons or amines catalyzes the chemiluminescence of 2a. The magnitude of the catalytic rate constant, and the efficiency of light production are correlated with the one electron oxidation potential of the hydrocarbon. Under these conditions the chemiluminescence results from a chemically initiated electron-exchange luminescence (CIEEL) path. GRA

N79-27282# Colorado School of Mines, Golden. Dept. of Chemical and Petroleum Refining Engineering.
ENTHALPY MEASUREMENT OF COAL-DERIVED LIQUIDS Quarterly Technical Progress Report, Apr. - Jun. 1978
A. J. Kidnay and V. F. Yesavage 1 Aug. 1978 18 p
(Contract EX-76-C-01-2035)
(FE-2035-12) Avail: NTIS HC A02/MF A01

Experimental measurements were completed on a middle distillate. A total of 52 enthalpy measurements were made covering the ranges 157 to 675 F and 130 to 1000 psia. DOE

N79-27283# California Univ., Berkeley. Lawrence Berkeley Lab.
HIGH-RESOLUTION EPR AND PIEZOSPECTROSCOPY STUDIES OF THE LITHIUM-OXYGEN DONOR IN GERMANIUM
E. E. Haller and L. M. Falicov Sep. 1978 8 p refs Presented at 14th Intern. Conf. on the Phys. of Semicond., Edinburgh, 11-14 Sep. 1978
(Contract W-7405-eng-48)
(LBL-8429; Conf-780919-4) Avail: NTIS HC A02/MF A01

Lithium-oxygen donors in germanium were studied at low concentration (< 10 to the 14th power/cu cm) by means of electron paramagnetic resonance and photoelectric piezospectroscopy. Four equivalent real-space positions with < 111 > symmetry which together with the four-valley conduction band lead to a 16-fold ground state. The system exhibits dynamic tunneling between the four equivalent orientations. DOE

N79-27284# Electricite de France, Paris. Div. Conversion Electrochimique.
BIBLIOGRAPHICAL STUDY OF ELECTROCATALYSIS INVOLVING MIXED OXIDE COMPOUNDS IN AN ALKALINE MEDIUM [ETUDE BIBLIOGRAPHIQUE DE L'ELECTROCATALYSE PAR LES OXYDES MIXTES EN MILIEU ALCALIN]
Jean Marie Gras May 1977 93 p refs In FRENCH
(P/539/77/20) Avail: NTIS HC A05/MF A01

Oxides already in use as hydrogen and oxygen electrodes are listed as well as other oxide compounds which have been shown experimentally to be of interest as catalysts. Their electrochemical properties are extensively examined in order to determine their potential for reducing anodic and cathodic overvoltage in hydrogen oxygen fuel cells and in electrolytic cells. The preparation of these compounds is also discussed. No catalyst being simultaneously a good conductor, resistant to anodic dissolution, and having good catalytic characteristics was found. However, results show nickel resists anodic corrosion and directs electron flow even though its electrocatalytic activity is rather poor. Author (ESA)

N79-27285# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
MEASUREMENT OF THE RATE CONSTANT FOR THE NO+HO2 YIELDS OH+NO2 REACTION USING LASER MAGNETIC RESONANCE [MESSUNG DER GESCHWINDIGKEIT DER REAKTION NO+HO2 GIBT OH+NO2 MIT HILFE DER LASER MAGNETISCHEN RESONANZ]
W. Hack, F. Kaufman, A. W. Preuss, and H. G. Wagner Apr. 1978 30 p refs In GERMAN; ENGLISH summary
(MPIS-8/1978) Avail: NTIS HC A03/MF A01; Max-Planck Inst. fuer Stroemungsforsch. Goettingen, West. Ger. DM 7,20

The rate constant of the gas phase reaction NO + HO2 yields NO2 + OH was measured in an isothermal discharge - flow system at 296 K and at pressures around 700 (Pa). The concentration profiles of OH- and HO2 radicals were measured directly with a laser-magnetic resonance spectrometer. The reaction H + O2 + M yields HO2 + M with He as the main carrier gas was used as the HO2-source. In all experiments NO was in large excess over HO2. The rate constant of the wall reactions of OH and HO2 were determined in separate experiments. The rate constant of the first reaction is found to be KI (296K) = (3.5 + or = 1) tera (cu cm/molsec). Previous measurements described in the literature are discussed.
Author (ESA)

N79-27286# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
RESEARCH ON ELEMENTARY HO2 AND OH RADICAL REACTIONS IN THE GAS PHASE USING LASER MAGNETIC RESONANCE Thesis - Goettingen Univ., West Ger. [UNTERSUCHUNG VON ELEMENTARREAKTIONEN DES HO2 UND OH RADIKALS IN DER GASPHASE MIT HILFE DER LASER MAGNETISCHEN REZONANZ]
August-Wilhelm Preuss Jul. 1978 148 p refs In GERMAN
(MPIS-10/1978) Avail: NTIS HC A07/MF A01; Max-Planck Inst. fuer Stroemungsforsch., Goettingen, West Ger. DM 24,30

These reactions are of considerable importance in nearly all the chemical reactions associated with atmospheric combustion and photochemical pollution processes. Laser magnetic resonance techniques were used to determine the rate constants of several important reactions. Sensitivities of 30 giga particles/cu cm (HO2) and 50 mega particles/bolometer were used as IR detectors.
Author (ESA)

N79-27287# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
IR LASER INDUCED DISSOCIATION OF N2F4 AND ISOMERIZATION OF CH3NC Thesis - Goettingen Univ., West Ger. [IR LASERE INGELEITETE DISSOZIATION VON N2F4 UND ISOMERISIERUNG VON CH3NC]
Carlo Kleinermanns Aug. 1978 80 p refs In GERMAN
(MPIS-12/1978) Avail: NTIS HC A05/MF A01; Max Planck Inst. fuer Stroemungsforsch., Goettingen, West Ger. DM 14,85

Experiments were carried out in the gas phase using a CO2 laser. The characteristics and reaction parameters associated with vibrationally excited N2F4 and CH3NC were determined. Gas chromatography, fluorescence intensities, fluorescence rise and decay times, and energy absorption measurements were made. Quantum efficiencies of dissociation reactions were determined as a function of gas pressures, laser energies, and frequencies. Author (ESA)

N79-27288# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
SOOT FORMATION IN COMBUSTION
H. G. Wagner Oct. 1978 40 p refs Presented at 17th Intern. Combust. Symp., Leeds, Engl., 1978

(MPIS-22/1978) Avail: NTIS HC A03/MF A01; Max-Planck Inst. fuer Stroemungsforsch., Goettingen, West Ger. DM 19,30

A selection of experimental results available are discussed in order to define soot formation. Conditions for soot formation are outlined and its appearance as a measure of combustion efficiency is evaluated for premixed flames, gaseous diffusion turbulent diffusion flames, and fuel spray flames as well as in diesel engines. Special emphasis is placed on the particle burning phase of soot formation. This aspect is then used in an in depth analysis of soot kinetics. Author (ESA)

N79-27289# National Physical Lab., Teddington (England). Div. of Chemical Standards.

DIPHENYL ETHER TRIPLE POINT CELLS

M. F. Vaughan Jul. 1978 61 p refs

(NPL-Chem-86) Avail: NTIS HC A04/MF A01

Three areas of thermometry were identified where devices which reproduce temperatures accurately and precisely with uncertainties ranging from + or - 0.0001 K to + or - 0.01 K are required. These are for, generally, monitoring the calibrations of thermometers, thermistors, etc.; providing an alternative method for calibrating liquid-in-glass thermometers, thermistors, etc.; and for checking and improving the calibration accuracy of platinum resistance thermometers. A review of possible methods indicates the triple-point cell as the most promising device. The preparation of diphenyl ether triple-point cells is described. Some of the cells have been certified by the Division of Quantum Metrology and there is good agreement over the values of the triple points. From these experiments it is estimated that the true triple point of diphenyl ether is 26.869 C with an estimated overall uncertainty of + or - 0.002 K. Author (ESA)

N79-27290# National Physical Lab., Teddington (England). Div. of Chemical Standards.

VAPOR LIQUID EQUILIBRIA FOR THE SYSTEMS WATER-METHANOL, WATERETHANOL, METHANOL-ETHANOL, AND WATER-METHANOL-ETHANOL AT 298.15 K DETERMINED BY A RAPID TRANSPIRATION METHOD

D. J. Hall, C. J. Mash, and R. C. Pemberton Jan. 1979 36 p refs

(NPL-Chem-95) Avail: NTIS HC A03/MF A01

Isothermal vapor-liquid equilibria were determined by means of a rapid transpiration technique at 298.15 K for the ternary mixture water-methanol-ethanol and for the binary mixtures water-methanol, water-ethanol, and methanol ethanol. Values of the molar excess Gibbs energy and the partial molar Gibbs energies were computed and the results tested for thermodynamic consistency. The binary mixture data were correlated by the Wilson, Redlich-Kister, NRTL and UNIQUAC equations and the ternary systems data predicted from the binary data. The Redlich Kister equation with added ternary terms was fitted to the binary and ternary data. The predicted values compare well with the experimental results. Author (ESA)

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N79-27291 Purdue Univ., Lafayette, Ind.

INVESTIGATION ON THE EFFECT THE STRAIN RATIO HAS ON SHEET METAL FORMABILITY Ph.D. Thesis

Kwok-sang Chui 1978 166 p

Avail: Univ. Microfilms Order No. 7914886

The hypothesis of this experiment was that materials having different strain ratio r could sustain different levels of surface strain. Since surface strain was considered as one of the most influencing factors of the sheet metal formability, it followed that the variation of the strain ratio would effect the formability of a sheet metal. The materials used were the aluminum killed steel, the I-F steel, and the rimmed steel. Two tests were performed to generate data for this experiment; they were the uniaxial tensile test and the biaxial stretching test.Dissert. Abstr.

N79-27292 Carnegie-Mellon Univ., Pittsburgh, Pa.

A STUDY OF THE ORDERING AND STRENGTHENING MECHANISMS IN AN OFF-STOICHIOMETRIC Ni-Mo ALLOY Ph.D. Thesis

Larry Alan Nesbit 1979 238 p

Avail: Univ. Microfilms Order No. 7916180

The ordering and strengthening mechanisms operating in an off-stoichiometric Ni-Ni4Mo alloy were investigated, as well as the precipitate morphology and deformation microstructure. Throughout the investigation, the direct space microstructure as well as the reciprocal space lattice were studied primarily by transmission electron microscopy. Slip lines and fracture surfaces were examined via scanning electron microscopy. Dissert. Abstr.

N79-27293# Dayton Univ. Research Inst., Ohio.

IMPACT DAMAGE ON TITANIUM LEADING EDGES FROM SMALL HARD OBJECTS Interim Technical Report, Jul. 1976 - Oct. 1977

T. Nicholas, John Barber, and Robert S. Bertke Nov. 1978 81 p

(Contract F33615-76-C-5124)

(AD-A068458; UDR-TR-78-54; AFML-TR-78-173) Avail: NTIS HC A05/MF A01 CSCL 11/6

Impact damage on titanium leading edge configurations was studied by performing a series of hard particle impact tests and characterizing the damage. Fatigue tests were used to assess the damage and to investigate the applicability of the concept of an equivalent elastic stress concentration factor to characterize severity of damage. Notch fatigue specimens were also fatigue tested in tension to provide baseline data for the titanium material. The data demonstrated reasonable reproducibility and showed that the extent of a particular type of damage could be categorized in terms of an equivalent elastic stress concentration factor. The fatigue test results also showed that the damage sustained from very small particles, which completely perforated the leading edge and removed material was essentially the same in terms of fatigue strength as a machined notch of the same geometry. Author (GRA)

N79-27294# Illinois Univ. at Urbana-Champaign, Urbana. Dept. of Physics.

LOW TEMPERATURE, GLASS-LIKE PROPERTIES OF CRYSTALLINE BETA-ALUMINA Ph.D. Thesis

P. J. Anthony 1978 167 p refs

(Contract EY-76-C-02-1198)

(COO-1198-1233) Avail: NTIS HC A08/MF A01

The low temperature properties measured for single crystal Na, Ag, K, and Li beta-alumina were characteristic of those found in amorphous materials. The specific heat was dominated below 1 K by a term approximately linear in temperature instead of the cubic dependence normal for crystals. All except K beta-alumina had an approximately quadratically temperature dependent thermal conductivity below 1 K and a nearly temperature independent thermal conductivity near 10 K. The dielectric susceptibilities of the beta-aluminas vary a few parts in 100 over three orders of magnitude in temperature, with the dependence again of the same form as those found in glasses. Unlike glasses, however, the variations of susceptibility for all but Li beta-alumina are found to be extremely anisotropic. The magnitudes of the measured properties were dependent on the species of metal ion present. DOE

N79-27295# Oak Ridge National Lab., Tenn.

FRACTURE TOUGHNESS OF FABRICATION WELDS INVESTIGATED BY METALLOGRAPHIC METHODS

D. A. Canonico and R. S. Crouse 1978 16 p refs Presented at the Metallographic Soc. Tech. Conf., Montreal, 16 Jul. 1978

(Contract W-7405-eng-26)

(CONF-780732-5) Avail: NTIS HC A02/MF A01

The intermediate scale test vessels (ITV) were fabricated to provide test specimens that have sufficient wall thickness and simulate light water reactor pressure vessels. They were fabricated from grades of steel that are similar to those used for nuclear pressure vessels, having a wall thickness of 150 mm and the same welded construction. They are, however, considerably smaller in height and diameter than actual vessels. To date, ten vessels have been fabricated and eight have been tested. In preparation for testing the eighth vessel (ITV-8), an extensive investigation was conducted of the toughness properties of the fabrication weld. It was thoroughly characterized and the fracture

specimens used in this metallographic investigation were taken from that weld metal. DOE

N79-27296# Oak Ridge National Lab., Tenn.
ANALYTICAL REPRESENTATION OF MECHANICAL PROPERTIES DATA FOR 2 1/4 Cr-1 Mo STEEL
M. K. Booker 1978 37 p refs Presented at the US/UKAEA Specialists Meeting on Mech. Properties, Oak Ridge, Tenn., 4 Dec. 1978
(Contract W-7405-eng-26)
(CONF-781219-6) Avail: NTIS HC A03/MF A01

Analytical representations for various mechanical properties of 2 1/4 Cr-1 Mo steel was developed. An evaluation of tensile, creep, fatigue, creep-fatigue, crack growth, and toughness data for this material was included. Data were collected from a variety of sources and stored in an existing computerized data storage and retrieval system to facilitate analysis. Most of these evaluations were used to develop data pages for the Nuclear Systems Materials Handbook. DOE

N79-27297# Ultrasonics International, Inc., Churchville, Pa.
ULTRASONIC PATTERN RECOGNITION STUDY OF INTERGRANULAR STRESS CORROSION CRACKS vs WELD CROWN REFLECTORS IN SS PIPING Interim Report
J. L. Rose and G. P. Singh Sep. 1978 41 p ref Prepared for Southwest Res. Inst., San Antonio, Tex.
(EPRI Proj. 892-1)
(EPRI-NP-891) Avail: NTIS HC A03/MF A01

Pattern recognition techniques for discriminating between geometrical and crack reflector signals obtained during ultrasonic inspection of the weld zone in type 304 austenitic stainless steel piping were applied to one set of data in an effort to improve the capability of inservice ultrasonic inspection to detect cracks in the vicinity of welds in nuclear reactor piping. A means of identifying the signal from a tight crack close to a weld crown is demonstrated. The method uses computerized processing of Fourier transforms of the acquired signals. The procedure is applicable to the analysis of existing test data, or it may be used to tailor improved inspection systems. DOE

N79-27298# Oak Ridge National Lab., Tenn.
ELEVATED TEMPERATURE DUCTILITY OF TYPES 304 AND 316 STAINLESS STEEL
V. K. Sikka 1978 20 p refs Presented at ASME Meeting, San Francisco, Calif., 10 Dec. 1978
(Contract W-7405-eng-26)
(CONF-781202-38) Avail: NTIS HC A02/MF A01

A phenomenon is known as ductility minimum was investigated. The strain rate, below which ductility loss was initiated, decreased with decreases in test temperature. Besides strain rate and temperature, the ductility minimum was also affected by nitrogen content and thermal aging conditions. Thermal aging at 649 C was observed to eliminate the ductility minimum at 649 C in both types of stainless steel. Such an aging treatment resulted in a higher ductility than the unaged value. Aging at 593 C still resulted in some loss in ductility. Results suggest that ductility-minimum conditions for stainless steel should be considered in design, thermal aging data analysis, and while studying the effects of chemical composition. DOE

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N79-27299 Princeton Univ., N. J.
TRANSITIONS ABOVE THE GLASS TRANSITION TEMPERATURE IN AMORPHOUS POLYMERS Ph.D. Thesis
Barbara Greenberg Schwartz 1979 194 p
Avail: Univ. Microfilms Order No. 7913996

Experiments on well-characterized samples of polystyrene and polymethylmethacrylate show that the liquid-liquid transition like the glass transition temperature, is dependent on molecular weight, and that there exists definite interrelationships between the solid-state transition, the glass transition, and the liquid-liquid transition. Torsional braid analysis is shown to be a unique and easy way of determining the critical molecular weight for chain entanglements. The liquid-liquid transition temperature is shown to be highly dependent upon the contact surface between polymer and substrate. Hand-made braids of Teflon trademark, Nomex trademark, carbon, heat-cleaned glass, and glass treated with silane coupling agents were investigated. It was found that the important variable to be considered in addition to the critical surface tension, is the solubility parameter, which defines the compatibility of the involved surfaces. Dissert. Abstr.

N79-27300 Connecticut Univ., Storrs.
THE SYNTHESIS OF SOME BIODEGRADABLE POLYMERS Ph.D. Thesis
Roby Mark Sinclair 1979 326 p
Avail: Univ. Microfilms Order No. 7914185

Several polyamides, polyesters, polyurethanes, copoly(amide esters) and copoly(amide urethanes) were prepared, and their susceptibilities towards enzyme hydrolysis and fungal attack determined. Phenylated polymers exhibited little hydrolysis and in many instances appeared to be more resistant than their unsubstituted analogs. Moderate to considerable weight losses were observed during a fourteen day exposure to buffered subtilisin for many of the copoly (amide esters) and copoly(amide urethanes) based on long repeat units. The length of the various repeating unit moieties was seen to have a marked effect upon the resulting susceptibility. Also, the substitution of the more flexible ester linkage in place of the urethane linkage enhanced the susceptibilities in several instances. The results indicate the importance of flexibility in the resulting biodegradation of the polymer.
Dissert. Abstr.

N79-27301 Connecticut Univ., Storrs.
THE MOLECULAR MORPHOLOGY OF POLYETHYLENE VIA NUCLEAR MAGNETIC RESONANCE Ph.D. Thesis
Kavilipalayam Muthusamy Natarajan 1979 151 p
Avail: Univ. Microfilms Order No. 7914177

The proton NMR second moment, M sub 2, in crystalline polyethylene, PEH, consists of two components: one intramolecular, and one intermolecular. The former was calculated from the PEH molecular structure; the latter can be obtained from the crystal lattice parameters. M sub 2 depends on internuclear distances to the inverse 6th power. Hence, M sub 2 probes only nearest neighbors. By carrying out an isotopic dilution experiment using perdeutero PEH, one can selectively attenuate the intermolecular contribution to M sub 2 and thereby determine the manner in which the PEH enters the crystal lamellae. These measurements give new insights into the molecular morphology of the crystal, i.e., the adjacent re-entry and switchboard morphologies. Dissert. Abstr.

N79-27302 North Dakota State Univ., Fargo.
PHOTOSENSITIZED CATIONIC POLYMERIZATION Ph.D. Thesis
Josef Hans Jilex 1979 99 p
Avail: Univ. Microfilms Order No. 7915508

Results of sensitization of diphenyliodonium and triphenylsulfonium hexafluoroarsenate by a variety of photosensitizers are presented. The effectiveness of each photosensitizer/onium salt combination was evaluated by monitoring gelation of a diepoxide monomer as a function of time of irradiation. To explain the photosensitization results, three mechanisms are considered: (1) classical energy transfer; (2) homolytic bond cleavage of the onium salt within a photosensitizer-onium salt excited state complex; and (3) electron transfer from the photosensitizer to the onium salt. Each mechanism was evaluated on the basis of energetics and it was concluded that the results are best explained in terms of the electron transfer mechanism. This led to studies in photosensitization of another electron acceptor, namely silver-hexafluoroantimonate, in place of the onium salts, to extend the principle. Dissert. Abstr.

N79-27303 North Dakota State Univ., Fargo.
DILUTE SOLUTION VISCOSITY OF WATER REDUCIBLE ACRYLIC RESINS Ph.D. Thesis
Delano Ray Eslinger 1978 99 p
Avail: Univ. Microfilms Order No. 7915506

The dilute solution behavior of water-soluble polymers is

determined by four effects: (1) charge repulsion between the fixed like charges on the polymer chain (polyion expansion); (2) an effect which serves to moderate polyion expansion (counterion binding); (3) preferential solvation of the polymer chain segments, and (4) intramolecular hydrophobic interactions. Dissert. Abstr.

N79-27304 Ohio State Univ., Columbus.
AN ULTRACENTRIFUGAL ANALYSIS OF POLYMER SIZE AND HEAT STABILITY OF CARRAGEENAN Ph.D. Thesis
Nitin Desai 1979 188 p
Avail: Univ. Microfilms Order No. 7915967

The dependency of molecular weight on polymer concentration was studied. It was related to solute interactions resulting in a conformational change, while the speed (or pressure) effect results in the depolymerization or disaggregation of the polymer network in solution. Kinetic parameters relating to the thermal stability of carrageenan in cacodylate buffer pH 7.0, containing 0.25 M sodium chloride was determined from polymer size data using sedimentation equilibrium. The thermal degradation of carrageenan is minimized in systems where the electrolyte concentration is high and where oxygen is effectively removed. Qualitative analysis by agarose electrophoresis showed that the proportion of carrageenan affected by heat was least when the stabilizer was present at relatively high concentrations. Dissert. Abstr.

N79-27305 North Carolina State Univ. at Raleigh.
AN EVALUATION OF THE REACTION OF CELLULOSE WITH ANHYDRIDES/AMMONIA FOR THE PRODUCTION OF FLAME RESISTANT CELLULOSE DERIVATIVES Ph.D. Thesis
Gary Steven Dagenhart 1978 156 p
Avail: Univ. Microfilms Order No. 7915523

The reaction of cellulose with amic acids in aqueous solution or anhydrides in aqueous ammonia was employed to produce unsaturated derivatives of cellulose in both all cellulosic fabrics and in polyester/cotton blends. Bromination of the unsaturated derivatives was found to result in self-extinguishing fabrics in cases where sufficient bromine was added. However, the added bromine lacked sufficient durability to maintain flame resistance after fifty home launderings. Problems encountered with these treatments included stiffening and loss of strength, due to the multiple treatments required, particularly in the case of the lightweight fabrics. Dissert. Abstr.

N79-27306*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADHESIVE MATERIAL TRANSFER IN THE EROSION OF AN ALUMINUM ALLOY
Joshua Salik and William A. Brainard May 1979 10 p refs
(NASA-TM-79165; E-028) Avail: NTIS HC A02/MF A01 CSCL 11A

In order to study the basic mechanisms of erosion, hardened steel balls were shot into annealed 6061 Al alloy targets at velocity of up to 150 m/sec. The projectiles were collected and examined by a scanning electron microscope combined with energy-dispersive X-ray analyzer and it was found that target material in substantial amounts is adhesively transferred to the projectile. The transferred material forms on the projectile surface a layer the thickness of which increases with increases in impact velocity. Author

N79-27307*# Podlaseck (Stanley E.), Littleton, Colo.
NONMETALLIC MATERIALS HANDBOOK. VOLUME 1: EPOXY MATERIALS
Stanley E. Podlaseck May 1979 249 p
(Contract NAS1-15133)
(NASA-CR-3133) Avail: NTIS HC A11/MF A01 CSCL 11I

Thermochemical and other properties data is presented for the following types of epoxy materials: adhesives, coatings finishes, inks, electrical insulation, encapsulants, sealants, composite laminates, tapes, and thermal insulators. A.R.H.

N79-27308*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AUGER SPECTROSCOPY ANALYSIS OF LUBRICATION WITH ZINC DIALKYLDITHIOPHOSPHATE OF SEVERAL METAL COMBINATIONS IN SLIDING CONTACT
Donald H. Buckley Jul. 1979 19 p
(NASA-TP-1489; E-9909) Avail: NTIS HC A02/MF A01 CSCL 11H

Sliding friction experiments were conducted with aluminum and other riders rubbing on disks of various elemental metals in the presence of a thin film of zinc dialkyldithiophosphate (ZDP). Auger emission spectroscopy was used to in situ monitor the changes in surface chemistry with rubbing under various loads. The metal disks examined included iron, titanium, rhodium, tungsten, molybdenum, and copper. For equivalent films of ZDP the film is a more effective lubricant for some metals than it is for others. The important active element in the compound varies with the metal lubricated and is a function of metal chemistry. The zinc in the ZDP is susceptible to electron beam induced desorption. Author

N79-27309*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MODULES OF RUPTURE AND OXIDATION RESISTANCE OF $12.55Al0.600.72N3.52 SIALON
Alan Arias Jul. 1979 15 p refs
(NASA-TP-1490; E-9971) Avail: NTIS HC A02/MF A01 CSCL 11B

A Sialon of formula Si2.55Al0.600.72N3.52 was made from ball-milled alpha-Si3N4, AlN, and SiO2 by sintering the powder compacts at 1760 C for 4 hours in stagnant nitrogen. This Sialon had an average modulus of rupture ranging from 404 megapascals (58.6 ksi) at room temperature to 254 megapascals (36.8 ksi) at 1400 C. Oxidation tests at 1400 C in air showed it to have a parabolic oxidation rate constant less than or equal to 2.8x10 to the -10th power sq g/cm4 hr, which is smaller than that of any other Si3N4-base ceramic reported in the literature. Author

N79-27310# Rutgers - The State Univ., Piscataway, N. J.
THE DEPENDENCE OF THE PIEZOELECTRIC RESPONSE OF POLY(VINYLIDENE) (VINYLIDENE FLUORIDE) ON PHASE 1 VOLUME FRACTION
J. I. Scheinbeim, K. T. Chung, K. D. Pae, and B. A. Newman 1 Apr. 1979 25 p refs Submitted for publication
(Contract N00014-75-C-0540; NR Proj. 356-564)
(AD-A067961; TR-14) Avail: NTIS HC A02/MF A01 CSCL 11/9

Since the initial discovery of the large piezoelectric response of poled, oriented films of poly(vinylidene fluoride) (PVF2) by Kawai, several subsequent studies have attempted to elucidate the mechanisms responsible for this phenomenon. Since the greatest piezoelectric activity (by at least a factor of 3) is found for poly(vinylidene fluoride) films with the phase I crystal structure, any satisfactory explanation of the effect must account for this feature. Mechanisms most often discussed are: a bulk polarization of the sample due to field induced reorientation or switching of the molecular dipoles in the polar, phase I crystals; non-uniform charge injection leading to an asymmetric distribution of real charge in the sample; a field induced charge-trapping of injected charge or ionic charges present as impurities; and some type of surface phenomenon caused by the strong interaction between the positive electrode and the film during poling. GRA

N79-27311# Science Applications, Inc., La Jolla, Calif.
NEW PERFLUOROPOLYMER-FORMING REACTIONS Final Report, 1 Mar. 1974 - 31 Mar. 1979
Madeline S. Toy 2 Apr. 1979 13 p refs
(Contract F44620-76-C-0027)
(AD-A067568; AFOSR-79-0442TR) Avail: NTIS HC A02/MF A01 CSCL 11/9

The principal lines of research activity pursued during the period of 1 March 1974 to 31 March 1979 are as follows: (1) Nature of oxygen-to-fluorine bond dissociations and additions, (2) New perfluoropolymer-forming reactions, (3) Synthesis of certain monomers and model compounds. Results and details of the investigations carried out in these three areas are given in fourteen papers completed for publication. The main accomplishments are described in the report. Bibliographies of papers are included. Author (GRA)

N79-27312# Naval Surface Weapons Center, Dahlgren, Va.
ANALYTICAL STUDY ON THE IDEAL RESPONSE OF NORMAL-MODE SHOCK-DEPOLED PZT FERROELECTRIC

CERAMICS WITH RESISTIVE, CAPACITIES, AND INDUCTIVE LOADS Final Report
W. Mock, Jr. and W. H. Holt Jul. 1978 62 p refs
(AD-A068552; NSWC/DL-TR-3822) Avail: NTIS HC A04/MF A01 CSCL 20/3

Electrical equations have been derived for the ideal response of normal-mode shock-depoled PZT ferroelectric ceramics with resistive, capacitive, and inductive loads. It was assumed in the analysis that charge was released from the PZT material completely and instantaneously at the shock front. Both rectangular and hollow-cylinder shapes were considered for the PZT unit. Expressions for the charge, voltage, current, and energy in the circuit were obtained for times during and after the traversal of the unit by the shock front. These results and the electrical properties of shock-depoled PZT 56/44 ceramics were used to estimate the geometrical size of PZT units in single-shot pulsed power supplies for energy converters with resistive and capacitive input characteristics. GRA

N79-27313# Kewanee Oil Co., Shidler, Okla.
NORTH STANLEY POLYMER DEMONSTRATION PROJECT Final Annual Report
B. M. DuBois Nov. 1978 92 p
(Contract ET-76-C-03-1805)
(BETC/RI-78/19; FAR-3) Avail: NTIS HC A05/MF A01

The efficiency of polymer enhanced water flooding in a sandstone reservoir is examined to determine the economic feasibility of the project. The present production response and the projected trends are reported. DOE

N79-27314# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
VISCOSITY AND ELECTRICAL CONDUCTIVITY OF GLASS MELTS AS A FUNCTION OF WASTE COMPOSITION
M. J. Plodinec and J. R. Wiley 1979 13 p refs Presented at the Intern. Symp. on Ceram. in Nucl. Waste Management, Cincinnati, 30 Apr. - 2 May 1979
(Contract EY-76-C-09-0001)
(DP-MS-78-80; Conf-790420-5) Avail: NTIS HC A02/MF A01

Simulated radioactive waste compositions containing varying ratios of iron to aluminum were added to glass melts to determine the effect on the melt properties. Waste containing high aluminum increased the melt viscosity, but waste containing high iron reduced the melt viscosity. Aluminum and iron both reduced the melt conductivity. DOE

N79-27315# Electricite de France, Paris. Div. Conversion Electrochimique.
THERMOPLASTIC MATERIALS CORROSION IN 40% KOH (120 C - 180 C) [CORROSION DES MATERIAUX THERMOPLASTIQUES PAR UNE SOLUTION DE POTASSE 40% (120 C - 180 C)]
Jean-Jacques Lecoz Jul. 1977 32 p refs In FRENCH
(P/539/77/26) Avail: NTIS HC A03/MF A01

Thermoplastic materials likely to be corrosion resistant in an alkaline solution and able to withstand working temperatures of 120 C or more, over entended periods were tested. The two kinds of testing conducted were complete sample dipping and half dipping in the presence of pressurized oxygen (10 bars). These KOH corrosion tests were also made on several nonmetallic materials. Results for corrosion are given in detail and the materials tested are then classified according to their maximal working temperatures. Author (ESA)

N79-27316# Centre Technique des Industries Mecaniques, St. Denis (France).
EXPERIMENTAL STUDY OF BONDING AGENTS USED IN MECHANICAL ASSEMBLIES Final Report [ETUDE EXPERIMENTALE DE COLLES POUR LA MECANIQUE]
D. Benazet and J. L. Joubert Jun. 1978 89 p In FRENCH
(CETIM-1-2J-03-0) Avail: NTIS HC A05/MF A01

Eleven types of industrial glues, selected so as to be representative of the bonding characteristics available for use in mechanical assembly, were tested and compared. The results are intended for use by engineering consultants as well as to provide an objective criteria for judging the completeness of technical literature provided by glue manufacturers on their products. Results outline comparison criteria, mechanical tests before and after aging in various environments, and working materials for which the glues are best suited. The experimental setups as well as test results are described in detail. Author (ESA)

N79-27317# Unilever Research, Vlaardingen (Netherlands).
THE INFLUENCE OF THE FORCES OF INTERACTION BETWEEN SOLIDS ON THEIR ADHESIVENESS
F. vanVoorstVader 1978 33 p refs In GERMAN; ENGLISH summary Presented at VDI Ges. fuer Verfahrenstech. u. Chem.ingr.wesen, Oberursel, West Ger., 20 Oct. 1976 Submitted for publication
Avail: NTIS HC A03/MF A01

The influence of the forces of interaction between solids on their adhesive strength, characterized by the work of adhesion, was studied. Only changes in the interfacial tension of solids could be determined experimentally, e.g. by measuring contact angles or adsorption isotherms. The changes in interfacial tension calculated from these measurements are in agreement with the measured changes in adhesive strength. If the adhering solids are slowly separated, the work of adhesion is equal to the difference between the interfacial tension of the adhering surfaces and that of the separated solid bodies. In the case of rapid separation of the solid bodies, the adhesive force exceeds its expected thermodynamic value. The work of adhesion must then be estimated by means of physical models of the force of interaction. Author (ESA)

N79-27318# Unilever, Plaine Saint-Denis (France).
COLLOID AND OTHER FORCES IN PARTICLE ADHESION AND PARTICLE REMOVAL: A REVIEW
J. Visser 1978 21 p refs Presented at Symp. of the Soc. of Chem. Ind., Loughborough Univ., Engl.
Avail: NTIS HC A02/MF A01

After a general introduction to the basic principles of adhesion, e.g., the van der Waals force of attraction and the electrostatic double layer repulsion including the role of humidity, the extension of the contact area, the effect of the structure of the surface and electrostatic charging on the basis of sphere/plate geometry; a survey is given of the techniques in use for studying the adhesion of particles to solid substrates. A technique developed for measuring the adhesion of colloidal particles to a solid surface by means of liquid flow is outlined as an illustration of the problems encountered in the determination of adhesive forces and in studying the mechanism of removal. Results of the adhesion of polystyrene particles to a cellophane surface as a function of pH are presented and interpreted in terms of van der Waals forces of attraction and electrostatic double layer forces of repulsion. Author (ESA)

N79-27319# Siemens A.G., Munich (West Germany).
DENSE TRANSPARENT FERROELECTRIC CERAMICS FOR OPTICAL APPLICATIONS Final Report
Gisbert Wolfram and Roman Schmidt Bonn Bundesmin. fuer Forsch. u. Technol. Oct. 1978 114 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-17) Avail: NTIS HC A06/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 23,95

Ceramics of good optical quality (porosity < 0.001, insertion loss < 9 dB/cm) were prepared from commercial oxide powders by a two-step sintering process. In PLZT 7/65/35 the longitudinal scattering effect was studied with respect to potential display applications. The results contributed to a better understanding of this effect. The picture quality which can be achieved in PLZT ceramics was determined in a photoconductor-ceramic sandwich functioning as a light-addressed image storage and display element. Experiments with matrix-addressed ceramic plates yielded only unsatisfactory contrast ratios. It was further shown that the switching characteristic of the ceramic can be influenced by light-induced space charges. This phenomenon was exploited to record pictures. The sensitivity of the ceramic to light, however, is small. In quasi ferroelectric PLZT ceramics the quadratic electrooptic effect was studied as a function of the lanthanum concentration. The application of the effect was demonstrated in an electrooptic shutter of large aperture, with shutter speeds on the order of 0.01 msec. In addition, preliminary experiments

aimed at employing PLZT ceramics in numeric displays were carried out. Author (ESA)

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N79-27320 Colorado School of Mines, Golden.
KINETICS OF COAL LIQUEFACTION TO PRE-ASPHALTENES, ASPHALTENES AND OILS Ph.D. Thesis
Mazen Ahmad Shalabi 1978 168 p
Avail: Univ. Microfilms Order No. 7912231

The kinetics and mechanism of coal liquefaction was studied in a 300 cc magnedrive autoclave batch reactor. The reactions were conducted with a ratio of coal to solvent (tetralin) of 1:10 and under a hydrogen blanket at a total pressure of 2000 psi. Three temperatures were investigated; 350, 375 and 400 C. Three models involving first order irreversible series/parallel reactions were discriminated for the raw data using a non-linear parameter estimation technique. The model that exhibited the lowest value of the determinant of moment matrix of residuals was considered the best in explaining the mechanism of coal dissolution. Arrhenius activation energies were calculated for each rate constant. The values ranged between 10-50 K cal/g mole. The high activation energies implied that the reactions of coal hydroliquefaction are kinetically controlled and not controlled by interfacial mass transfer. Dissert. Abstr.

N79-27321*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
COMPATIBILITY OF ELASTOMERS IN ALTERNATE JET FUELS
S. H. Kalfayan, R. F. Fedors, and W. W. Reilly 1 Jun. 1979 70 p refs
(Contract NAS7-100)
(NASA-CR-158773; JPL-Pub-79-28) Avail: NTIS HC A04/MF A01 CSCL 21D

The compatibility of elastomeric compositions of known resistance to aircraft fuels was tested for potential use in Jet A type fuels obtainable from alternate sources, such as coal. Since such fuels were not available at the time, synthetic alternate fuels were prepared by adding tetralin to a petroleum based Jet A type fuel to simulate coal derived fuels which are expected to contain higher amounts of aromatic and hydroaromatic hydrocarbons. The elastomeric compounds tested were based on butadiene-acrylonitrile rubber, a castable Thiokol polysulfide rubber, and a castable fluorosilicone rubber. Batches of various cross-link densities of these rubbers were made and their chemical stress relaxation behavior in fuel, air, and nitrogen, their swelling properties, and response to mechanical testing were determined. Author

N79-27322# Committee on Appropriations (U. S. Senate).
ALCOHOL FUELS
Washington GPO 1978 712 p refs Special hearing before the Comm. on Appropriations, 95th Congr., 2d Sess., 1978
(GPO-22-334) Avail: SOD HC

The potential value of alcohols as an additional energy source was presented. Gasohol fuel production, uses, and combustion efficiency were discussed. M.M.M.

N79-27323*# Aerojet Liquid Rocket Co., Sacramento, Calif.
HIGH PERFORMANCE N2O4/AMINE ELEMENTS BLOW-APART Final Summary Report
B. R. Lawver Mar. 1979 50 p refs Original contains color illustrations
(Contract NAS9-14186)
(NASA-CR-160272) Avail: NTIS HC A03/MF A01 CSCL 21I

An experimental and analytical program was conducted to develop an understanding of the mechanisms controlling hypergolic propellant reactive stream separation (RSS). RSS is a combustion induced phenomenon that results in striation of hypergolic propellant oxidizer and fuel sprays fans. This reduced intraelement mixing can influence thrust chamber performance, heat transfer, and stability. The program and product were the development of design criteria for coping with RSS to allow the design of high performance, stable injectors. G.Y.

N79-27324*# Aerojet Liquid Rocket Co., Sacramento, Calif.
HIGH PERFORMANCE N2O4/AMINE ELEMENTS BLOW-APART Final Report
Mar. 1979 171 p refs Original contains color illustrations
(Contract NAS9-14186)
(NASA-CR-160273; FR-14186-DRL-5) Avail: NTIS HC A08/MF A01 CSCL 20I

Hypergolic earth-storable N2O4/Amine propellants are used for a wide range of liquid propulsion system applications. These propellants are highly reactive and can experience reactive stream separation (RSS, i.e., blowapart) which can inhibit intraelement mixing, hence reducing the overall spray mixture ratio and mass distribution, which can result in altered combustion efficiency, gas-side heat transfer coefficient, and stability. An experimental and analytical program was conducted to develop an understanding of the mechanisms controlling RSS. The program and product was development of design criteria for coping with RSS to allow the design of high performing, stable injectors. RSS mechanisms were identified using high speed color photography to observe reactive stream mixing of single element injectors tested with N2O4/MMH, N2O4/A-50, and N2O4/N2H4 propellants. The parametric characterization included modeling of the Space Shuttle Orbital Maneuvering System and Reaction Control System engine injectors. G.Y.

N79-27325# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
THE UTILIZATION OF A NATIONAL POLYMER ACQUIRED FOR SOLID PROPELLANTS USED IN SPACE VEHICLES [UTILIZACAO DE UN POLIMERO NACIONAL NA OBTENCAO DE COMBUSTIVEL SOLIDO PARA VEICULOS ESPACIAIS]
Wilson A. Almeida Apr. 1979 20 p refs In PORTUGUESE; ENGLISH summary
(INPE-1473-RPE/024) Avail: NTIS HC A02/MF A01

A preliminary investigation on the effects of polymer binders on composite solid propellant ballistic behaviour is described. Such a study is directed to the development of an effective solid fuel for space applications. The choice of some binders is based on the propellant optimized compositions corresponding to maximum specific impulse. G.Y.

N79-27326*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MODELING OF POLYMER NETWORKS FOR APPLICATION TO SOLID PROPELLANT FORMULATING
H. E. Marsh 15 Jun. 1979 151 p refs
(Contract NAS7-100)
(NASA-CR-158788; JPL-Pub-79-10) Avail: NTIS HC A08/MF A01 CSCL 21I

Methods for predicting the network structural characteristics formed by the curing of pourable elastomers were presented; as well as the logic which was applied in the development of mathematical models. A universal approach for modeling was developed and verified by comparison with other methods in application to a complex system. Several applications of network models to practical problems are described. M.M.M.

N79-27327# Battelle Pacific Northwest Labs., Richland, Wash.
INVESTIGATION OF GASIFICATION OF BIOMASS IN THE PRESENCE OF CATALYSTS
L. K. Mudge, L. J. Sealock, Jr., R. J. Robertus, D. H. Mitchell, E. G. Baker, and P. C. Walkup 1978 34 p refs Presented at 5th Biomass Thermochem. Conversion Coordination Meeting, Richland, Wash., 19-20 Sep. 1978
(Contract EY-76-C-06-1830)
(CONF-7809125-1) Avail: NTIS HC A03/MF A01

The technical and economic feasibility of catalyzed biomass gasification to produce the specific products methane, hydrogen, carbon monoxide, or synthesis gas for generation of ammonia, methanol, or hydrocarbons are reported. The work in the current reporting period was centered on laboratory studies to determine the relative activity of Na2CO3 and trona and 3 1/2 times as much as borax or uncatalyzed wood at both 550 and 650 C.

The effect of biomass composition on gas production was determined by gasifying wood, bark, and cellulose. In all cases bark samples produced more gas than their respective woods. The use of combined catalysts to optimize methane production was studied. Initial screening of catalysts was begun. The design, procurement, and installation of the process development unit is described. DOE

N79-27328# Institute of Gas Technology, Chicago, Ill.
STUDY OF THE BEHAVIOR OF GAS DISTRIBUTION EQUIPMENT IN HYDROGEN SERVICE UPDATE 1978
Dale G. Johnson, Walter J. Jasionowski, and Jon B. Pangborn 1978 12 p refs Presented at Chem. Hydrogen Energy Systems Contracts Rev., Wash., D. C., 28-30 Nov. 1978
(Contract EY-76-C-02-2907)
(CONF-781142-5) Avail: NTIS HC A02/MF A01

Existing in-place components and piping with the possible exception of meters should be adequate for hydrogen delivery. Due to the required flow increase of hydrogen, mechanical limitations of in-place meters will probably necessitate replacement with similar but larger capacity meters. In isolated situations, the difference in pipe flow characteristics of natural gas and hydrogen may necessitate a small increase either in delivery pressure or pipeline volume to provide equivalent energy delivery rates. The hydrogen-to-natural gas volumetric leak ratio for individual components will range from 2.5 to 5 and possibly greater, depending on the permeation characteristics of the material of construction and the joining methods. DOE

N79-27329# Pittsburgh and Midway Coal Mining Co., Shawnee Mission, Kans.
SOLVENT REFINED COAL (SRC) PROCESS: ENVIRONMENTAL PROGRAM. VOLUME 3: PILOT PLANT DEVELOPMENT WORK, PART 5 Interim Report, 1 Jul. 1977 - 30 Jun. 1978
Jan. 1979 56 p refs Prepared by Alsid, Snowden and Associates
(Contract EX-76-C-01-0496)
(FE-0496-T8; IR-27) Avail: NTIS HC A04/MF A01

Baseline studies of air and water quality were performed before the pilot plant was constructed. Similar studies were made in 1976 during plant operation. These studies indicate that the pilot plant had virtually no measureable impact on air and water quality in the surrounding environment. As a result of the 1976 study, the monitoring frequency was reduced to alternate monthly water and air samples with an annual foliage observation. The results of the 1976-78 years of monitoring indicate that no substantial change in the environment occurred as a result of the SRC plant. DOE

N79-27330# Brigham Young Univ., Provo, Utah.
MIXING AND KINETIC PROCESSES IN PULVERIZED COAL COMBUSTORS
L. D. Smoot Aug. 1978 31 p refs
(EPRI Proj. 364-1)
(EPRI-FP-806-SY) Avail: NTIS HC A03/MF A01

An atmospheric coal combustion furnace which feeds up to 57 kg of coal per hour was constructed in sections with one section containing several sampling probes. The probes allow for simultaneous gas-particulate sampling and are positioned in the reactor to sample both radially and axially. The use of gas and particulate tracers in conjunction with the sampling and analysis permits the determination of: (1) the local extent of mixing of primary and secondary gases; (2) the local extent of particle dispersion; (3) the local extent of particle reaction; and (4) the local extent of pollutant formation. Two additional tasks supported the combustion testing, a pulverized coal furnace modeling development and a series of cold-flow jet mixing experiments. Two computer models were identified. Cold-flow tests investigated the mixing characteristics of particle laden, confined jets under conditions that simulate the operations of industrial pulverized coal furnaces and gasifiers but without chemical reaction. The effects of geometry and flow conditions were investigated in 120 cold tests. ERA

N79-27331# Braun (C. F.) and Co., Alhambra, Calif.
COAL GASIFICATION, COMMERCIAL CONCEPTS, GAS COST GUIDELINES, REVISION 1 Final Report
R. Skamser Aug. 1978 40 p refs Revised
(Contract EX-76-C-01-2240)
(FE-2240-100) Avail: NTIS HC A03/MF A01

The guidelines contain all the information and procedures that are required to calculate, on a consistent basis, the cost of producing high Btu pipeline quality gas from coal. The design basis for coal gasification plants is presented. Coal analyses, environmental requirements, plant size, equipment design guides, and equations for gas costs were included using either utility or private investor financing. The cost of gas was determined primarily by the plant investment which is obtained from estimates of the installed cost of equipment. DOE

N79-27332# Department of Energy, Pittsburgh, Pa. Energy Research Center.
STABILITY OF COAL-OIL MIXTURES
J. M. Ekmann and D. Bienstock 1978 28 p refs Presented at 1st Intern. Symp. Coal Oil Mixture Combustion, St. Petersburg, Fla., 8 May 1978
(CONF-7805152-1) Avail: NTIS HC A03/MF A01

The settling behavior of both stabilized and nonstabilized coal-oil mixtures was investigated. Thirteen stabilizers were tested under standardized conditions. Several were found to be partially effective for the coal-oil combination studied. The majority provided no improvement over the nonstabilized mixture and, in fact, decreased the stability in some cases. A fifty percent mixture was found to be stable in the oil used for the stabilizer tests. The viscosity data are of value in predicting pressure drop in pipeline flow and may be used, in conjunction with the settling curves, to compare simple models of sedimentation, and to identify the mechanisms of settling in coal-oil mixtures. DOE

N79-27333# Hamilton Standard, Windsor Locks, Conn.
METHANE PRODUCTION FROM BEEF CATTLE FEEDLOTS
D. J. Lizdas 1978 22 p refs Presented at 2d Symp. on Fuels from Biomass, Troy, N. Y., 20 Jun. 1978
(Contracts EY-76-C-02-2952; EG-77-C-01-4015)
(CONF-7806107-2) Avail: NTIS HC A02/MF A01

The residues from beef cattle in feedlots provide an easily collectible source of biomass that can be converted to fuel gas and other useful products. The status of two programs are described and presented. The first program was a pilot scale evaluation to determine the feasibility of producing methane and a cattle refeed product from dirt feedlot residues using anaerobic fermentation. The second was for design, construction and operation of a full scale anaerobic fermentation facility to identify the technical and economic viability of producing fuel gas and a refeed product from the residues from an environmental beef cattle feedlot. DOE

N79-27334# Institute for Industrial Research and Standards, Dublin (Ireland).
IEA BIOMASS INFORMATION SERVICE. CURRENT AWARENESS BULLETIN, MAY - JUNE 1978
Sep. 1978 111 p Prepared in cooperation with Natl. Board for Sci. and Technol., Dublin
(NP-23641) Avail: NTIS (US Sales Only) HC A06/MF A01; DOE Depository Libraries

This bibliography covers fuel generation and premium biomass usage of animal wastes and crop residues; general utilization, fuel generation, and named systems for domestic urban wastes; forest residue and cellulose utilization in short rotation forestry; and general and review topics. DOE

N79-27335# Mitre Corp., McLean, Va. METREK Div.
COMPARATIVE ECONOMIC ASSESSMENT OF ETHANOL FROM BIOMASS
Sep. 1978 140 p refs
(Contract ET-78-C-01-2854)
(HCP/ET-2854) Avail: NTIS HC A07/MF A01

Fourteen studies and reports in which the economic aspects of producing ethanol from various biomass feed-stocks were evaluated. These studies presented 28 ethanol plant configurations. The major assumptions made and the financial and cost/performance parameters used for each configuration were identified. This information was used to compute life cycle costs of ethanol production using the full life cycle cost model and

the systems to project the utilization of renewable resources model. The differences between ethanol selling prices given in the studies reviewed and those obtained with the models are discussed. Life cycle costs were also calculated using a common set of financial parameters for all ethanol configurations. DOE

N79-27336# Department of Energy, Washington, D. C. Office of Regulations and Emergency Planning.
FINDINGS AND VIEWS CONCERNING THE EXEMPTION OF AVIATION GASOLINE FROM THE MANDATORY PETROLEUM ALLOCATION AND PRICE REGULATIONS
Jun. 1978 85 p
(DOE/ERA-0024) Avail: NTIS HC A05/MF A01

An added section to the regulation which requires that any amendment submitted to the Congress for the purpose of exempting a petroleum product or refined product category from regulation be supported with certain findings and views on a variety of matters related to the exemption was presented. Based on an analysis of historic and projected supply, demand, and price trends, the DOE concluded that allocation and price controls are no longer necessary for aviation gasoline and that its exemption in addition to satisfying the other requisite criteria of Section 12 of the EPAA, consistent with the attainment of the objectives specified in Section 4 (b)(1) of the EPAA. DOE

N79-27337# Department of Energy, Washington, D. C. Energy Information Admin.
THE 1980 MOTOR GASOLINE SUPPLY AND DEMAND. ANALYSIS MEMORANDUM AM/ES/79-12
E. Tukenmez, R. Farmer, H. McDaniel, C. Everett, and H. Walton Dec. 1978 44 p
(DOE/EIA-0102/32) Avail: NTIS HC A03/MF A01

For 1980 motor gasoline consumption is projected to range from 7.58 to 7.96 MMB/D depending on the level of economic activity and the extent of improvement in the fuel efficiency of the automobile fleet. Depending on the state of the economy, low levels of conservation indicate a range of 1980 consumption levels which vary from 7.88 to 7.96 MMB/D. With high conservation the levels are from 7.58 to 7.66 MMB/D. With 1980 consumption of motor gasoline at these projected levels, the refining industry will have to take certain actions to increase supplies, particularly to offset the effects of the sharp phasedown of octane-increasing lead additives. The industry will be required to reduce the lead level to about 0.5 grams per gallon by October, putting pressure on downstream refinery units which make high octane clear pool gasoline. The estimated effect of this phasedown is a reduction of possible gasoline output by about 500 thousand barrels per day in 1980. DOE

N79-27338# Toronto Univ. (Ontario). Dept. of Chemical Engineering and Applied Chemistry.
MATERIAL AND ENERGY BALANCES IN THE PRODUCTION OF ETHANOL FROM WOOD
Morris Wayman, J. H. Lora, and E. Gulbinas 1978 19 p refs Presented at Symp. on Chem. for Energy, Winnipeg, Canada, Jun. 1978
(CONF-7806139-1) Avail: NTIS HC A02/MF A01

Experimental production of ethanol from aspen wood gave yields of 70.7% or 83.4% when acid hydrolysis or enzymatic hydrolysis were used after autohydrolysis and extraction of lignin. These were, respectively, 58.4 and 68.9 gallons of 95% ethanol per ton of aspen wood (dry basis). In addition 426 lb of lignin with heat of combustion 11,100 Btu/lb were obtained per ton of wood. Multi-stage hydrolysis was beneficial for both acid and enzymatic hydrolysis, 80% and over 99% of theoretical yields of sugar being obtained by the two processes. Economic estimates show a significant advantage in investment and operating costs for the enzymatic process. The price of 95% ethanol, including a reasonable return on investment by this process is estimated at $1.34/gallon. DOE

N79-27339# Mathematica, Inc., Princeton, N. J.
COAL LIQUEFACTION: REPORT ON A FOCUS GROUP DISCUSSION
Irving Crespi 10 Nov. 1978 53 p
(Contract EV-78-C-01-6388)
(DOE/TIC-10039) Avail: NTIS HC A04/MF A01

The consensus was that demonstration projects are needed for all coal liquefaction processes and that it is premature to narrow consideration to only one or two. Although the various processes are technically different, the end-use products are said to be essentially interchangeable. The general feeling is that, at this time, little is known about the comparative technical problems, costs, and market potential of SRC-2 as compared with other coal liquefaction processes. Government financing is felt to be essential. It was agreed that the potential market for coal liquefaction products is primarily for use in oil boilers and not in motor fuels. DOE

N79-27340# Propellants, Explosives and Rocket Motor Establishment, Westcott (England).
AN EXPERIMENTAL STUDY OF THE SENSITIVENESS OF UNCONFINED HYDROCARBON-AIR MIXTURES TO DIRECT DETONATIVE INITIATION
G. Hooper Sep. 1978 62 p refs
(PERME-TR-44; BR65035) Avail: NTIS HC A04/MF A01

An experimental technique is described whereby the sensitiveness of a number of hydrocarbon/air mixtures is assessed in terms of direct detonative initiation from solid explosive charges. A microwave interferometer is used to monitor continuously the propagation of the reaction zone in the gaseous system over a path length of several meters and to give a reliable distinction between detonation and deflagration. The hydrocarbons acetylene, ethylene, ethane, propane, butane, isobutane, and methane are ranked in order of the sensitiveness of the stoichiometric fuel/air mixtures. The critical initiation energy of ethane is measured as a function of fuel/air stoichiometry. Ethane, the most abundant impurity in natural gas, turns out also to be the most sensitive; the minimum initiation energy for various stoichiometric methane/ethane/air is assessed. A brief literature survey is included. Author (ESA)

N79-27341# Versuchsanstalt fuer Geoelektrik und Blitzschutz, Vienna (Austria).
INVESTIGATION OF FLOW PHENOMENA IN PULVERIZED COAL GASIFICATION FOR THE NEW PROCESS Final Report
Richard Jung Bonn Bundesmin. fuer Forsch. u. Technol Dec. 1978 137 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch u. Technol.
(BMFT-FB-T-78-27) Avail: NTIS HC A07/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 28.60

The influence of flow conditions on the distribution of pulverized coal in gaseous fluids was studied. Experiments on a model provided the fundamentals for the design and calculation of flow routes in the oxidation and degasification stages as well as a confirmation of the calculation method for cyclone separators known from the literature. The results obtained can be applied to industrial plant design. Author (ESA)

N79-27342# Institute of Gas Technology, Chicago, Ill.
EVALUATION OF THE FLASH DESULFURIZATION PROCESS FOR COAL CLEANING Final Report, Nov. 1975 - Jun. 1977
Donald K. Fleming and Robert D. Smith Jan. 1979 155 p refs
(Contract EPA-68-02-2126)
(PB-292328/2; EPA-600/7-79-016) Avail: NTIS HC A08/MF A01 CSCL 21D

Results of a program to develop (on the laboratory, bench, and pilot scale) operating conditions for key steps in the flash process for desulfurizing coal by chemical and thermal treatment are given. Laboratory and bench scale data on high-sulfur eastern U.S. coals prove that the process can reduce sulfur to the point that the resulting solid fossil fuel can be directly consumed in compliance with current regulations for SOx emissions. Because of operating and technical difficulties pilot scale test data are inconclusive. As conceived, the process incorporated a material that has a greater chemical affinity for the sulfur than the coal has. Use of a sulfur-getter is required to reduce the H2S concentration in the gas. Data indicate that the concept is sound. GRA

N79-27615*# Southern California Gas Co., Los Angeles.
SYNTHETIC NATURAL GAS IN CALIFORNIA: WHEN AND WHY

W. B. Wood *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 249-252 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

N79-27616*# Gulf Mineral Resources Co., Denver, Colo.
STATUS REPORT THE SRC-1 AND SRC-2 PROCESSES
George E. Chenoweth *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 258-261 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

N79-27617*# Ashland Oil and Refining Co., Ky.
THE H-COAL PROCESSES: A STATUS REPORT
William C. Voss *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 262-267 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

N79-27618*# Exxon Research and Engineering Co., Florham Park, N. J.
EXXON DONOR SOLVENT COAL LIQUEFACTION PROCESS
W. R. Epperly, L. E. Swabb, Jr., and J. W. Tauton *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 268-272 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

N79-27619*# Vulcan-Cincinnati, Inc., Ohio.
METHANOL FROM COAL
Donald R. Miller *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 273-277 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N79-27343# Naval Ocean Systems Center, San Diego, Calif.
NOSC METROLOGY LABORATORY: CAPABILITIES SUMMARY
Mar. 1979 22 p
(AD-A068564; NOSC/TD-219) Avail: NTIS HC A02/MF A01 CSCL 14/2

The Naval Ocean Systems Center's Metrology Laboratory, operated by the Product Assurance Division, Code 931, is located in building 128, rooms 142 and 143, Bayside. The Laboratory, with more than 1000 pieces of precision standard and special measuring equipment, is well equipped to perform almost any measurement of size, form, and finish that may be required. For example, the Laboratory has the basic capability of measuring linear dimensions to 0.000002 inch and angular dimensions to 0.1 second of arc. In addition, features of form such as roundness, concentricity, flatness, perpendicularity, and parallelism can be checked. The Laboratory includes instruments to measure surface finish, material hardness, spring forces, and deflection. Also included are optical measuring devices such as flats and squares, as well as an optical dividing head. Other optical equipment such as reflection mirrors, microscopes, optical targets, alignment telescopes, collimators, and monochromatic light sources are availble, as are 14-inch and 30-inch optical comparators. Special measurement requirements usually can be met by utilizing a combination of available standard measuring equipment. Personnel associated with the Laboratory are available to discuss unusual measurement requirements. GRA

N79-27344# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
ADVICE ON THE SETTING UP OF A WORKSHOP FOR TREATING TRITIUM GAS LIGHT SOURCES AT 527 ECW AT DONGEN
May 1978 14 p In DUTCH
Avail: NTIS HC A02/MF A01

Tritium occurs in light sources mainly in the form of hydrogen gas, but also a certain amount in the form of tritiated water vapor. From a radiation-hygienic standpoint, the latter form determines the safety regulations to be taken, because this radioactive water vapor is absorbed to a considerable amount by the human body via inhalation and via the skin. The work space must satisfy various demands. The distances over which the apparatus and accessories are transported must be as short as possible. The floors must be seamless, the walls must be decontaminated. There must be storage in the work room for radioactive materials and this facility must be fireproof. The apparatus must work on a seamless and well decontaminated working surface. The air velocity in the opening on the front side must amount to approximately 40 cm/sec with normal use. A ventilator can be placed in the ceiling with a water-tight design. The air supply in the space must be regulated in such a way that the whole space is provided with fresh air. Author

N79-27345# Institut fuer das Bauen mit Kunststoffen e.V., Darmstadt (West Germany).
DESCRIPTION OF THE POSSIBILITIES FOR ENERGY SAVINGS DURING THE DESIGN AND CONSTRUCTION OF APERTURES IN BUILDINGS (CROSS-SECTION REPORT) Final Report
Gerhardt Knappke Bonn Bundesmin. fuer Forsch. u. Technol. Sep. 1978 118 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-15) Avail: NTIS HC A06/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 24,80

Various sources of energy loss in buildings are discussed to determine the necessary improvements in windows, doors, skylights, etc for new and old buildings. Indications of the way in which the energy consumption in a building is dependant on the apertures to the outside of the building are given. References are made to existing standards, directives, and specifications. For each case, construction recommendations are given.
Author (ESA)

N79-27608*# Energy Transportation Systems, Inc., San Francisco, Calif.
PROSPECTS FOR COAL SLURRY PIPELINES IN CALIFORNIA
John F. Lynch *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 123-126 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13I

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

N79-27346 California Univ., Berkeley.
ELECTROMAGNETIC SCATTERING BY TWO-DIMENSIONAL INHOMOGENEITY DUE TO AN OSCILLATING MAGNETIC DIPOLE Ph.D. Thesis
Ki Ha Lee 1978 84 p
Avail: Univ. Microfilms Order No. 7914669

A numerical method of computing the electromagnetic response of two-dimensional earth models to an oscillating magnetic dipole is presented. The generalized electromagnetic variational integral is reduced to a sum of two-dimensional variational integrals by Fourier transformation. Discretization of each two-dimensional integral is carried out in terms of the secondary electric fields using the finite element method. Following the variational principle, each harmonic integral is reduced to a set of simultaneous equations. From each set of electric field solutions obtained by solving the simultaneous equations, the secondary magnetic fields are computed numerically. After inversely Fourier transforming the secondary electric and magnetic fields, the total fields are finally obtained by adding and analytically calculated primary fields. Dissert. Abstr.

N79-27347 Syracuse Univ., N. Y.
SU(3) GAUGE THEORIES OF WEAK AND ELECTROMAGNETIC INTERACTIONS AND STRONG INTERACTION SYMMETRY BREAKING Ph.D. Thesis
Jagadisan Kandaswamy 1978 172 p
Avail: Univ. Microfilms Order No. 7914227

Two models of unified weak electromagnetic interactions based on the groups SU(3) and SU(3)XU(1) are proposed and discussed. In the first theory, the consequences of assigning the electron, the muon and the Perl lepton to an SU(3) octet are explored. The hadron sector of the theory and neutral current reactions are also described as well as the modifications of the theory needed to make it compatible with neutral current experimental data. In the second model, based on SU(3)XU(1), charged gauge bosons are allowed to mix and the resulting phenomenological consequences are described. A current algebra treatment of the low-lying spin zero meson mass spectrum is given on the basis of a Lagrangian which includes not only the quark mass symmetry breaking terms but also the simplest effective term which breaks the U(4)xU(4) down to SU(4)xSU(4) x quark number. Dissert. Abstr.

N79-27348*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MULTIPLE BAND CIRCULARLY POLARIZED ANTENNA Patent Application
I-Ping Yu, inventor (to NASA) (Lockheed Electronics Co., Houston, Tex.) Filed 22 Jun. 1979 21 p
(Contract NAS9-15200)
(NASA-Case-MSC-18334-1; US-Patent-Appl-SN-051270) Avail: NTIS HC A02/MF A01 CSCL 09A

A multiple band antenna assembly for communicating electromagnetic raadiation is presented. An antenna element stack was constructed of a plurality of elliptical lamina antenna elements multually separated by layers of dielectric material, and separated from a ground plane by dielectric material. The antenna assembly was coupled through a feed line in contact with the top antenna element. A conductor was used to join the remaining antenna elements to the ground plane. Each individual antenna element was operable for communication reception and transmission within a frequency band determined by the size of the particular antenna element. The sizes of the antenna elements can be selected to provide electromagnetic radiation communication over several distinct frequency bands, or to connect the individual bands into a broad band. NASA

N79-27349*# Axiomatix, Los Angeles, Calif.
ORBITER CIU/IUS COMMUNICATIONS HARDWARE EVALUATION Final Report
Gaylord K. Huth 29 Jun. 1979 179 p refs
(Contract NAS9-15409)
(NASA-CR-160271; R7906-8) Avail: NTIS HC A09/MF A01 CSCL 17B

Inertial Upper Stage (IUS) and DoD Communication Interface Unit (CIU) communication system design, hardware specifications, and interfaces were evaluated to determine their compatibility with the Orbiter payload communication and data handling equipment and the Orbiter network communication equipment. M.M.M.

N79-27350*# Georgia Inst. of Tech., Atlanta. Electromagnetics Lab.
RESEARCH IN MILLIMETER WAVE TECHNIQUES Semiannual Status Report, 15 Dec. 1978 - 15 Jun. 1979
R. E. Forsythe and J. L. King 15 Jul. 1979 56 p
(Grant NsG-5012)
(NASA-CR-158785) Avail: NTIS HC A04/MF A01 CSCL 20N

The following technical developments are described: (1) a reliable 183 GHz subharmonic mixer, (2) a precision noise figure test setup, (3) the successful deposition of SiO2 on a noncontacting backshort, and (4) sturdier whisker points used for diode contacting. R.E.S.

N79-27351*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SATELLITE COMMUNICATIONS FOR DISASTER RELIEF OPERATIONS
Joseph N. Sivo 1979 20 p refs Proposed for presentation at Intern. Astron. Federation Munich, 17-23 Sep. 1979
(NASA-TM-79198; E-078) Avail: NTIS HC A02/MF A01 CSCL 17B

The use of existing and planned communication satellite systems to proveide assistance in the implementation of disaster relief operations on a global basis was discussed along with satellite communications system implications and their potential impact on field operations in disaster situations. Consideration are given to the utilization of both INTELSAT and MARISAT systems operating at frequencies ranging from 1.5 to 4 GHz and to the size and type of ground terminals necessary for satellite access. Estimates of communication requirements for a global system are given. Some discussion of cost estimates for satellite services to support operations are included. Studies of communication satellites for both pre and post disaster applications conducted for NOAA are included as well as recent experiments conducted in conjunction with the Office of Foreign Disaster Assistance of the Agency for International Development. M.M.M.

N79-27352# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ELECTRICAL GROUP IMPEDANCE MEASUREMENTS IN THE UNITED STATES BETWEEN 200 AND 415 kHz Final Report, Oct. 1976 - Mar. 1978
S. A. Arcone and A. J. Delaney Dec. 1978 95 p refs
(Contract DOT-FATQWAI-707)
(AD-A068088; FAA-RD-78-103) Avail: NTIS HC A05/MF A01 CSCL 20/14

The use and evaluation of radiowave methods of measuring earth resistivity in the low frequency (LF) band, and the developement of estimated effective ground resistivity maps in this same band for the United States including Alaska, are discussed. Both airborne and ground methods were investigated by using the wavetilt and surface impedance techniques. The airborne methods discussion concentrates on the use of the wavetilt technique in the very-low frequency (VLF) band because LF transmitters operate at a wide range of frequencies and supply inadequate coverage. It is concluded that over much of the central United States VLF airborne resistivity approximately LF ground resistivity. Geological and physiolographic effects on LF resistivity are demonstrated in several studies and the data are used to produce an estimated effective conductivity map of the United States. M.M.M.

N79-27353# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ELECTROMAGNETIC WAVES IN FREE SPACE
J. A. Bittencourt May 1979 37 p
(INPR-1475-RPE/026) Avail: NTIS HC A03/MF A01

A review of the fundamental features of electromagnetic waves propagating in free space are reviewed as well as some of the basic concepts about waves, necessary for the study of wave phenomena in plasmas. The solution of the wave equation, satisfied by the electric and magnetic field vectors, in terms of plane waves is presented along with the characteristics of harmonic waves. The concepts of wave polarization, energy flow, wave packets and group velocity are also examined. M.M.M.

N79-27354# Communications Research Centre, Ottawa (Ontario).
TERRAIN AND IONOSPHERIC EFFECTS ON ELT TRANSMISSIONS TO A SARSAT SPACECRAFT
F. H. Palmer May 1979 14 p refs
(CRC-1324) Avail: NTIS HC A02/MF A01

In order to carry out an RF link analysis for a Search and Rescue Satellite System (SARSAT) it is necessary to determine the effects of local terrain and surface cover, and of the ionosphere, on emergency locator transmitter (ELT) transmissions. The results of a research carried out by the Communications Research Centre (CRC) in order to assess the probable magnitude of such effects are summarized. It is concluded that signal attenuation and fading of an ELT signal, due to local topography and surface cover, probably do not exceed about 6 dB at spacecraft elevations above about 20 deg, except possibly in Pacific Coast forest areas. Considerable fading of the 121.5 MHz frequency may be caused by the night time, high altitude ionosphere. A major

area of uncertainty is the actual radiation pattern of an ELT under crash conditions. An appropriate measurement program of such patterns is suggested. S.E.S.

N79-27355# Communications Research Centre, Ottawa (Ontario).
THE APPARENT NOISE TEMPERATURE OF THE EARTH AS SEEN BY A SARSAT SPACECRAFT RECEIVING ANTENNA
F. H. Palmer May 1979 20 p refs
(CRC-1323) Avail: NTIS HC A02/MF A01

In order to carry out an RF link analysis for a Search and Rescue Satellite System (SARSAT) it is necessary to determine the apparent noise temperature of the earth, as seen by the spacecraft antenna. Such an analysis has been carried out in the United States. The original noise temperature estimates were verified and the Canadian remote area situation in which urban areas of the U.S.A. do not contribute significantly to the observed noise levels was studied. Results show that the spacecraft antenna noise temperature will likely fall within the following ranges: (1) 121.5 MHz = 2500 - 10000 K; (2) 243 MHz = 1000 - 3500 K; and (3) 406 MHz = 400 - 750 K. S.E.S.

N79-27356# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
REMOTE SENSORING OF THE SOUTHEAST REGION OF THE STATE OF SAO PAULO: A PROPOSITION OF A METHODOLOGY FOR THE GEOLOGICAL INTERPRETATION OF SLAR IMAGES [SENSORIAMENTO REMOTO NA REGIAO SUDESTE DO ESTADO DE SAO PAULO: PROPOSICAO DE UMA METODOLGIA PARA INTERPRETACAO GEOLOGICA COM IMAGENS SLAR]
Chan Chiang Liu, Paulo Roberto Meneses, and Waldir Renato Paradella Apr. 1979 35 p refs
(INPE-1461-NTE/148) Avail: NTIS HC A03/MF A01

A method of geological mapping in Precambrian regions of polycyclic and polyphasic evolution is proposed using radar (SLAB) imagery as the medium of study. A multi-stage procedure was adopted in this study. First, a standard geological cross section was selected and mapped in great detail in the field and the field data was then used as the base of the second researching stage, photointerpretation of the radar imagery. The results of this research denote that this method would be the better utilization of radar imagery for regional geological mapping.
R.E.S.

N79-27357# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
EXPLORATORY DEVELOPMENT OF RESONANT METAL RADOMES Final Report, 1 Jun. 1976 - 31 Mar. 1978
William R. Bushelle and L. Clyde Hoots Jul. 1978 208 p refs
(Contract F33615-76-C-5157; AF Proj. 7371)
(AD-A067547; AFML-TR-78-106) Avail: NTIS HC A10/MF A01 CSCL 17/9

The results of an exploratory development program conducted for the Air Force Materials Laboratory to define, develop, and demonstrate a slotted metal coating for radomes are reported. In this program a number of approaches for fabricating a metallic radome were defined. Of these approaches, three were developed and evaluated. The evaluation considered environmental resistance, electrical performance and economic factors. The following environmental tests were performed which demonstrate the feasibility of building a flightworthy resonant metal radome: lightning and rain erosion resistance, precipitation static reduction, temperature/humidity/altitude cycling, corrosion and solvent resistance, and sunshine exposure. GRA

N79-27358# Air Force Avionics Lab., Wright-Patterson AFB, Ohio.
PROPAGATION EFFECTS ON SATELLITE COMMUNICATION SYSTEMS OPERATING IN THE RANGE OF 240 TO 3000 MEGAHERTZ Final Report, Oct. 1976 - Oct. 1977
Wade T. Hunt Oct. 1978 36 p refs
(AF Proj. 1227)
(AD-A067535; AFAL-TR-78-145) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report provides systems designers with information on propagation effects in the 240 MHz to 3 GHz frequency range which may affect satellite communication link operations.
Author (GRA)

N79-27359# Computer Sciences Corp., San Diego, Calif.
HF CHANNEL SIMULATOR FOR WIDEBAND SIGNALS DEVIATIVE ABSORPTION AND GROUND WAVE ATTENUATION IN THE HF CHANNEL, ADDENDUM 1 Technical Report, Oct. 1977 - Oct. 1978
R. Lugannani, H. G. Booker, and L. E. Hoff San Diego, Calif. NOSC 6 Nov. 1978 48 p refs
(Contract N00123-74-C-0312; XF21222091)
(AD-A067906; NOSC/TR-208-Add-1) Avail: NTIS HC A03/MF A01 CSCL 20/14

A mathematical model of the wideband HF channel has been developed and a software version of the model presented. This addendum augments that model by including deviative absorption loss for the skywave returns and by providing for automatic calculation of the groundwave attenuation. With these additions, the model more accurately portrays the HF channel and has increased utility. A software version of the revised channel model is implemented and a listing of the program is appended. GRA

N79-27360# Naval Postgraduate School, Monterey, Calif.
COMPUTER MODELING OF VOICE SIGNALS WITH ADJUSTABLE PITCH AND FORMANT FREQUENCIES M.S. Thesis
Geoffrey Thomas Hall Dec. 1978 129 p refs
(AD-A067556) Avail: NTIS HC A07/MF A01 CSCL 17/2

Digital encoding of speech to allow more efficient transmission at low data rates involves the decomposition of the speech waveform into various parameters which are related to the physical structure of the speech production process. In this thesis, linear predictive coding is used to produce a set of coefficients for the characteristic polynomial of successive 25 msec. Segments of the voice tract, in the z-domain. The location of the poles in the z-plane and the excitation pitch period are then shifted and the signal reformulated to cause changes of the overall frequency characteristics of the speech waveforms, while maintaining the perceived sounds and information content. The resulting audio tapes confirm the theory and conjectures of the thesis.
Author (GRA)

N79-27361# SRI International Corp., Menlo Park, Calif.
PLATTEVILLE HEATING RESULTS: HF RADAR OBSERVATIONS Technical Report, 1 Jan. - 31 Dec. 1978
Robert L. Showen and Walter B. Zavoli Jan. 1979 33 p refs
(Contract N00014-75-C-0930; NR Proj. 088-076; SRI Proj. 4062)
(AD-A068163; TR-43) Avail: NTIS HC A03/MF A01 CSCL 20/14

Measurements were made during the Platteville ionospheric heating experiments. The measurements, made at the Wide Aperture Research Facility (WARF) were of the HF-induced backscatter over Colorado. The standard Field-Aligned Scatter (FAS) was seen from about 16 to 30 MHz, and an absolute cross section of 10 million square meters was observed. Possible enhancements of direct scatter and round-the-world propagation through the heated region were noted. Attempts to measure elevated mode propagation from Australia to the heated region will be made in the near future. GRA

N79-27362# Harris Corp., Melbourne, Fla.
APPLICATION OF A CORRELATION DISCRIMINANT OPERATOR TO PERTURBATIONAL ADAPTIVE ALGORITHMS Final Technical Report, May 1977 - May 1978
G. Patrick Martin Griffiss AFB, N. Y. RADC Apr. 1979 308 p
(Contract F30602-77-C-0073; AF Proj. 5556)
(AD-A068890; RADC-TR-79-44) Avail: NTIS HC A14/MF A01 CSCL 17/4

A primary objective of this study was to develop and apply a newly conceived, generalized technique for adaptive array reference function generation to a large class of systems having no null steering AJ protection. Because the reference function generation technique, referred to here as a correlation discriminant

operator or signal recognizer, does not depend upon filtering unwanted noise, it can be orders of magnitude faster than conventional reference function generation approaches. Thus a correlation discriminant operator facilitates the realization of a fast adaptive signal-to-noise ratio maximizing algorithm even in the case of narrowband desired signals having narrowband a priori discriminants. In addition, the correlation discriminant operator enables an algorithm to achieve optimum expected value adaptation transients and steady-state solutions. GRA

N79-27363# Utah Univ., Salt Lake City. Dept. of Computer Science.
ESTIMATION OF THE PARAMETERS OF AN AUTOREGRESSIVE PROCESS IN THE PRESENCE OF ADDITIVE WHITE NOISE
William John Done Dec. 1978 220 p refs
(Contract N00173-77-C-0041)
(AD-A068749; UTEC-CSC-79-021) Avail: NTIS HC A10/MF A01 CSCL 17/2

It is known that the addition of white noise to an Autoregressive (AR) process produces data that can be described by an autoregressive moving-average (ARMA) model. The AR coefficients of the ARMA model are identical to the AR coefficients of the original AR process. This dissertation investigates the practicality of this model for estimating the coefficients of the original AR process. The mathematical details for this model are reviewed. Those for the autocorrelation method linear prediction (LP) algorithm are also discussed. Experimental results obtained from several parameter estimation techniques are presented. These methods include the autocorrelation method for LP and a Newton-Raphson algorithm which estimates the ARMA parameters from the noisy data. These estimation methods are applied to several AR processes degraded by additive white noise. Results show that using an algorithm based on the ARMA model for the data improves the estimates for the original AR coefficient. GRA

N79-27364# George Washington Univ., Washington, D. C.
MAXIMUM ENTROPY SPECTRAL ANALYSIS IN THE SPATIAL DOMAIN Phase Report, Jun. - Dec. 1977
William R. King Jul. 1978 71 p refs
(Contract F30602-75-C-0121)
(AD-A068558; RADC-TR-78-160) Avail: NTIS HC A04/MF A01 CSCL 17/9

Desirable antenna pattern characteristics include high resolution, accurate angular prediction, peak detection at low signal-to-noise power ratio levels, and stability under noisy conditions and multiple target environments. In this necessarily encompassing and cursory investigation, antenna patterns computed using MESA have exhibited these desirable properties to a relatively high degree of measure. Resolution with MESA is exceptional even under noisy conditions and in multiple and mixed target environments. High resolution is maintained even at very large angles of incidence. Estimates of signal angle appear to be quite accurate even under difficult signal conditions, and peak detection with MESA is obviously better than that provided by the Fourier transform. However, it is perhaps most significant that MESA exhibits good stability properties with use of the optimal filter. GRA

N79-27365# Illinois Univ. at Urbana-Champaign, Urbana. Electromagnetics Lab.
ANALYSIS OF ARBITRARILY SHAPED WIRE ANTENNAS RADIATING OVER A LOSSY HALF-SPACE Interim Technical Report
P. Parhami and R. Mittra Mar. 1979 137 p refs
(Grant DAAG29-77-G-0111)
(AD-A068548; UIEM-79-6; UILU-ENG-79-2546; ARO-14686.4-EL) Avail: NTIS HC A07/MF A01 CSCL 20/14

The problem of an arbitrarily oriented current element over a lossy half-space is analyzed in this work. Various numerical approaches are developed and discussed for evaluating the infinite Sommerfeld integrals appearing in the vector potential expressions. In particular, a technique based on the steepest descent path integration is introduced for exact evaluation of these integrals, and, as an efficient alternative, an additional technique is developed based on approximating the well-behaved Fourier transform expressions of the Sommerfeld integrals. The latter technique has the merit of not requiring any time-consuming infinite integrations and, at the same time, is shown to yield accurate results for a wide range of parameters of practical interest. Finally, in this paper, the thin-wire antenna problem over a lossy half-space is analyzed via the method of moments and the current element solution techniques discussed earlier. Several antenna examples are included to demonstrate the effect of the lossy half-space on their input impedance and the far-field radiation patterns. GRA

N79-27366# Rome Air Development Center, Griffiss AFB, N.Y.
MICROSTRIP ANTENNA ELEMENTS FOR USE IN HEMISPHERICALLY SCANNED ARRAYS
Nicholas P. Kernweis and John McIlvenna Feb. 1979 30 p refs
(AF Proj. 4600)
(AD-A068566; RADC-TR-79-43) Avail: NTIS HC A03/MF A01 CSCL 09/5

This report is an experimental study of various modifications that affect the radiation pattern of a circular disc microstrip element. The objective is to produce an element pattern with enhanced performance in the angular regions well away from broadside. The study includes the effect of higher order modes, an investigation of circumferential loading, the use of shorting pins at the element edge, and the pattern changes produced by mutual coupling in a closely spaced array. GRA

N79-27367# Technical Univ. of Denmark, Lyngby. Inst. of Electromagnetics.
[ACTIVITIES OF THE LABORATORY OF ELECTROMAGNETIC THEORY] Annual Report, 1977
1977 26 p
Avail: NTIS HC A03/MF A01

Research projects in the fields of wave propagation and communications, remote sensing, optical fibers, antennas, electromagnetic compatibility, and radio anechoic chamber measurements are briefly described. Main teaching activities and publications are listed. Author (ESA)

N79-27368# Laboratoire Central de Recherches Thomson-CSF, Orsay (France). Lab. Acoustique-Magnetisme.
ION IMPLANTATION AND ITS EFFECTS ON THE PROPAGATION OF ELASTIC SURFACE WAVES Final Report [EFFETS DE L'IMPLANTATION D'IONS SUR LES CARACTERISTIQUES DE PROPAGATION DES ONDES ELASTIQUES DE SURFACE]
P. Hartemann and P. Cauvard Aug. 1977 79 p refs In FRENCH
(Contract DRME-76/34-143)
(LCR-494-305) Avail: NTIS HC A05/MF A01

The effects of ion implantation on piezoelectric materials used as substrates in surface wave transducers were studied. A strong effect on the temperature coefficient of delay was noted for quartz. The influence of annealing on variations in the surface wave propagation velocity in quartz was also determined. A slight increase in surface wave propagation losses as a result of implantation was observed in quartz at 960 MHz. This value was also measured in lithium niobate at 1 GHz. At 150 MHz a surface wave guide was implanted in lithium niobate. A bilinear factor approximately 49 dBm was obtained with a silicon resonator using this type of guide to focus the elastic energy. Author (ESA)

N79-27369# Laboratoire Central de Recherches Thomson-CSF, Orsay (France).
A CENTRAL MULTICHANNEL COUPLER FOR CONNECTIONS BETWEEN FIBER OPTIC BUNDLES Final Report [COUPLEUR CENTRAL MULTIVOIES POUR LIAISONS PAR FAISCEAUX DE FIBRES OPTIQUES]
L. Dauria, A. Jacques, and J. Dubos 5 Sep. 1977 75 p refs In FRENCH
(Contract DRME-76/34-252-00-480-75-01)
(LCR-14077) Avail: NTIS HC A04/MF A01

A seven-channel fiber optic coupler was characterized and studied in order to find ways of reducing the dispersion of detected levels on a single receiving channel. Two types of couplers were analyzed. These are couplers with grouped bundles and couplers

having detachable bundles with a central rectilinear U-shape fiber. The influence of a diffuser in the middle of the central fiber was especially studied. Characteristics examined include attenuation at the emitting and receiving bases relative to grouped bundles, loss at insertion for detachable bundles, and the dispersion of detected levels on a receiving channel. Results show the star coupler configuration performs better than the 'T' type.
Author (ESA)

N79-27370# Forschungsinstitut fuer Hochfrequenzphysik, Werthhoven (West Germany).
ECCM: PERFORMANCE OF RADAR SIGNAL DESIGN
H. J. Bueckmann Jul. 1978 55 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Verteidigung
(Rept-5-78) Avail: NTIS HC A04/MF A01

Antijamming performance against noise jamming and deception is improved under certain conditions by means of radar signal design. The most efficient noise jammers are given for two general kinds of radar signal processing, i.e. matched filter and optimal filter processing. Deception jammers are considered which first measure the parameters of a radar signal and then reproduce it from these data. The necessary reproduction quality is determined by the tolerable amount of deterioration of the ambiguity main lobe. Examples and general conclusions are given. The achieved reproduction quality is determined by the reproduction errors. These, and the deception resistance of the radar, are increased with increasing time-bandwidth product of the radar signal and with increasing randomness of the radar signal.
Author (ESA)

N79-27371# Forschungsinstitut fuer Hochfrequenzphysik, Werthhoven (West Germany).
CORRELATION OF NARROW BAND RECEIVER SIGNALS WITH REFLECTION INTERFERENCE OF THE INCIDENT WAVE FIELD
W. Soentgerath Jul. 1978 32 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Verteidigung
(Rept-6-78) Avail: NTIS HC A03/MF A01

Received-signal correlation with interference of the incident wave field due to reflection on point and plane scatterers located at various distances from the receiving antenna was investigated. The influence of the configuration between reflection points and the antenna array is discussed. The theoretical investigations are illustrated by experimental results with a two-element array and a neighboring plane reflector. Author (ESA)

N79-27372# Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).
COMPUTER CONTROLLED NEAR FIELD MEASUREMENTS FOR TESTING STEERABLE ARRAY ANTENNAS Thesis - Tech. Hochschule, Aachen
G. Hueschelrath Feb. 1978 121 p refs In GERMAN; ENGLISH summary
(FFM-263) Avail: NTIS HC A06/MF A01

A solution of the main problems of array antenna measurements is given. A small antenna is used as a probe in the near field region to generate a set of data depending upon the probe locations and a special control program of the array. These data are used to compute the characteristic array parameters on a universal computer. These computations are based on a model which describes the array and the probe configuration by a matrix representation. The desired array parameters result in the solution of the equation based upon the measured data. Author (ESA)

N79-27373# Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).
FORMATION TRACKING, PART 1: BASIC THEORY AND FORMATION TRACK INITIATION
G. Binias Mar. 1978 62 p refs In GERMAN; ENGLISH summary
(FFM-265) Avail: NTIS HC A04/MF A01

Problems of computer-controlled single-target tracking in dense target environments are described. Measures to be taken, related to single-target tracking, used to overcome the correlation problems and a demonstration of shortcomings of these measures, especially in dealing with dense target environments, are discussed. A concept of formation target tracking, deviating from single-target tracking is presented. Formation tracking is based on the collective track development of the formation targets. The first step necessary to the implementation of the procedure is the process of formation track initiation, described here in detail. Author (ESA)

N79-27374# Fondazione Ugo Bordoni, Rome (Italy).
OPTICAL TREATMENT OF INFORMATION [TRATTAMENTO OTTICO DELL'INFORMAZIONE]
Benedetto Daino Nov. 1977 23 p refs In ITALIAN
(FUB-17-1977) Avail: NTIS HC A02/MF A01

The fundamental principles signal processing are discussed along with the possible applications of these techniques to radar signal processing, reconstruction of deformed images, etc. Only coherent optical systems are considered. The use of Fourier transforms in the analysis of optical systems and the application of optical systems to signal processing are examined. Examples of optical filters applications to signal detection are given.
Author (ESA)

N79-27375# Fondazione Ugo Bordoni, Rome (Italy).
COMPUTATION OF ATTENUATION AND PHASE SHIFT PER UNIT LENGTH DUE TO SPHERICAL RAIN DROPS [CALCOLO DELL'ATTENUAZIONE E DELLO SFASAMENTO PER UNITA DI LUNGHEZZA DOVUTI A PIOGGIA COSTITUITA DA GOCCE SFERICHE]
Dario Maggiori and Aldo Paraboni (Politec. di Milano) Feb. 1977 23 p refs In ITALIAN
(FUB-24-1977) Avail: NTIS HC A02/MF A01

A data processing program is described for the computation of the effects of raindrops on wave propagation at frequencies over 10 GHz. The program is composed of (1) computation of the complex refraction index of water for a given frequency and water temperature, (2) computation of the coefficients of model amplitude of the spherical harmonic series expansion of the diffused field for the diameter of raindrops according to Laws-Parsons relationship of diameters distribution as per rainfall intensity, (3) computation of the extinction and phase sections, and (4) computation of the attenuation and phase shift per unit length. The subroutines and functions used in the program are described. Author (ESA)

N79-27376# Thomson-CSF, Meudon-la-Foret (France). Dept. Espace-Satellites.
FEASIBILITY STUDY FOR A SATELLITE FREQUENCY MODULATED RADIO COMMUNICATION SYSTEM Final Report [ETUDE DE FAISABILITE D'UN SYSTEME DE RADIO-DIFFUSION SONORE A MODULATION DE FREQUENCE PAR SATELLITE, VOLUME I]
V. Biggi, B. VidalSaint Andre, P. MacNamara (Telecommun. Ltd), and F. Horgan (Telecommun. Ltd) Oct. 1978 148 p Partly in FRENCH and ENGLISH 2 Vol.
(Contract ESA-3208/77-F-HGE(SC))
(ESA-CR(P)-1151-Vol-1) Avail: NTIS HC A07/MF A01

The final report on the feasibility study for a satellite frequency modulated radio communication system is presented. The main subjects covered are the ground link (antenna gain, attenution effects, multipath problems, etc.), the space link (power stage, multiplexing, large orbital antennas), and the parametric study of space to ground communication (industrial noise, wave polarization, optimal frequency, transmitting, power, etc.). The system is reported feasible for national communication purposes and is more economic for low latitude countries than others. The choice of the 1 GHz frequency for the space to ground link is confirmed. Author (ESA)

N79-27377# Thomson-CSF, Meudon-la-Foret (France). Dept. Espace-Satellites.
FEASIBILITY OF LARGE ORBITAL ANTENNAS Final Report: Annex [ETUDE DE FAISABILITIE D'UN SYSTEME DE RADIO-DIFFUSION SONORE A MODULATION DE FREQUENCE PAAR SATELLITE.VOLUME 2: EXAMEN DES POSSIBILITES DE REALIZATION DE GRANDES ANTENNES DE SATELLITE]
1978 115 p refs In FRENCH 2 Vol.
(Contract ESA-3208/77-F-HGE(SC))
(DFH/DSP-032/78-Vol-2; ESA-CR(P)-1151-Vol-2) Avail: NTIS HC A06/MF A01

The state of the art of large satellite antennas is reviewed

in light of assessing the feasibility, given European technology, of a 10 to 20m orbital antenna which is part of a frequency modulated radio communication system proposed by the European Space Agency. Two antenna geometrics were chosen, being the direct illumination parabolic reflector type and the cassegrain type. Both arrays have a gain of 34 dB, a cone opening of 2 deg, are 9 to 10m in diameter, have a focal distance of 4m, and weigh from 100 to 150 kg. For an antenna with a cone opening of only 1 deg and a diameter of 20m, a solution was not found, however, among the alternatives examined metallized balloon technology is considered the most valid approach to the problem. Antenna dimensioning data are given as appendixes.
Author (ESA)

N79-27378# Research Inst. of National Defence, Stockholm (Sweden).
IDENTIFICATION OF URBAN AND RURAL MULTIPATH OBJECTS BY MEANS OF A NEW MEASURING TECHNIQUE
Lars Ladell and Booje Jansson Nov. 1978 14 p refs Presented at 19th URSI Gen. Assembly, Helsinki, 1-8 Aug. 1978
(FOA-C-30149-E2) Avail: NTIS HC A02/MF A01

A measuring technique combining multipath propagation measurement, i.e. measurement of pulse response, and bearing measurement using a direction finder is presented. Perspectives in the understanding of groundwave propagation are highlighted. This technique is illustrated by means of measurements on a line-of-sight path in Stockholm City at 445 MHz. Two different multipath objects were identified by this procedure.Author (ESA)

N79-27379# Oxford Univ. (England). Dept. of Engineering Science.
SOFTWARE CODING FOR RELIABLE DATA COMMUNICATION IN A REACTOR SAFETY SYSTEM
R. Maghsoodi 1978 52 p refs
(OUEL-1264/78) Avail: NTIS HC A04/MF A01

A software coding method is proposed to improve the communication reliability of a microprocessor based fast-reactor safety system. This method, which replaces the conventional coding circuitry, applies a program to code the data which is communicated between the processors via their data memories. The system requirements are studied and suitable codes are suggested. The problems associated with hardware coders and the advantages of software coding methods are discussed. The product code which shows a faster coding time over the cyclic code is chosen as the final code. Then the improvement of the communication reliability is derived for a processor and its data memory. The result is used to calculate the reliability improvement of the processing channel as the basic unit for the safety system. Author (ESA)

N79-27380# Laboratorio di Ricerca e Technologia per lo Studio del Plasma nello Spazio, Frascati (Italy).
THE TRANSFER FUNCTION AND BROWNIAN NOISE OF THE GRAVITATIONAL ANTENNA [FUNZIONE DI TRASFERIMENTO E RUMORE BROWNIANO DELLA ANTENNA GRAVITAZIONALE]
G. V. Pallottino and G. Pizzella Jan. 1978 18 p refs In ITALIAN
(LPS-78-1) HC A02/MF A01

An equivalent circuit of the gravitational antenna was used to calculate the transfer function that relates the outlet tension to applied force. Brownian noise and Johnson noise were then considered. Several noise calculating methods, based on different physical hypothesis and with various precision levels, are discussed. Results show that noise inlet spectra can be classified into two categories, pseudo-Brownian resonant noise and white or pink Large band noise, depending on the spectral density distribution. Author (ESA)

N79-27381# Laboratorio di Ricerca e Technologia per lo Studio del Plasma nello Spazio, Frascati (Italy).
OPTIMIZATION OF THE NOISE TO SIGNAL RATIO IN A SINGLE PHOTON COUNTING PHOTOMULTIPLIER [OTTIMIZZAZIONE DEL RAPPORTO SEGNALE-RUMORE IN UN FOTOMOLTIPLICATORE PER IL CONTEGGIO DI SINGOLO FOTONE]
F. Congeduti and A. Ricotta Aug. 1978 54 p refs In ITALIAN
(LPS-78-6) Avail: NTIS HC A04/MF A01

Increasing the yield of a photomultiplier which is part of an atmospheric parameters telemeasuring system was studied. The experiments performed with an EMI 9558 A photomultiplier are described. The signal to noise ratio was improved by a factor of 2 when cooling from 20 to -5 C while the introduction of a magnetic field improved results 12 fold. Author (ESA)

N79-27382# Fondazione Ugo Bordoni, Rome (Italy).
CALCULATION OF THE ATTENUATION AS A FUNCTION OF RAINFALL INTENSITY FOR SEVERAL POLARIZATIONS [CALCOLO DEL LEGAME ATTENUAZIONE INTENSITA DI PRECIPITAZIONE PER VARIE POLARIZZAZIONI]
Dario Maggiori and Aldo Paraboni (Politec. di Milano) Oct. 1977 29 p refs In ITALIAN
(FUB-43-1977) Avail: NTIS HC A03/MF A01

A mathematical model was developed for the atmospheric propagation during rainfall of electromagnetic waves at frequencies over 10 GHz. A Laws-Parson drop-size distribution, a drop attitude distribution and a uniform rain profile were assumed. Two planes of propagation were considered. Tables containing several types of attenuation coefficients calculated for horizontal, vertical, bisecting, and circular right and left polarization are given. A discussion of results is included, with special reference to cross-polarization applications and experimental verification.
Author (ESA)

N79-27383# AEG-Telefunken, Ulm (West Germany).
ELECTRONIC COMPONENTS FOR HIGH SPEED SIGNAL PROCESSING IN FIBER OPTICAL COMMUNICATION Final Report
Peter Russer Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1977 40 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-77-75) Avail: NTIS HC A03/MF A01, ZLDI Munich DM 8,20

Progress in the development of electronic components for high speed signal processing in fiber optical communication is reported. For the transmitter, a transistor power stage (200 mA output current, 1 nsec ri time), step recovery diode amplifier (voltage amplification factor 4, 500 psec pulse width), and step recovery diode multiplexer (1 - 3.3 Gbit/sec) were built using thin film technology. The modulation behavior of injection lasers at 250 Mbit/sec was investigated experimentally and theoretically. An improvement in the modulation behavior and in the spectra of injection lasers was shown theoretically possible. For the receiver, and ECL-threefold OR gate (rise and fall times below 350 psec) clock amplifier (12.5 dB gain, 550 MHz bandwidth) were built also with thin film technology. Finally, a demultiplexer with phase locked clock extraction was built. Author (ESA)

N79-27384# Siemens-Schuckertwerke A.G., Munich (West Germany).
VIDEO TRANSMISSION WITH REDUCED INFORMATION RATE (PICTURE COMPRESSION). A SYSTEM WITH SOURCE CODING FOR TRANSMISSION OF VIDEO SIGNALS FOR PORTRAIT VIDEOTELEPHONE Final Report
Juergen Burgmeier, Juergen Gier, Walter Heinlein, and Wolfgang Thoma Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1978 133 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-50) Avail: NTIS HC A07/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 27,75

Two concepts for the coding of a 1 MHz videotelephone signal are analyzed. The first concept consists of intraframe differential pulse code modulation (DPCM) followed by an interframe coding stage operating on the dot-interlaced frame repetition principle. Details are given on the design and performance of the intraframe-DPCM with fixed prediction algorithms. The second concept consists of an interframe coding system in which no information has to be transmitted for stationary areas of a recorded scene. This concept relies on a three-dimensional DPCM, uses a special type of spatial-temporal filtering, and reduces the sampling rate. Results show that only the second system is capable of obtaining good picture quality when using a transmis-

sion bit rate of 2 Mbit/sec, (1 bit per picture element).
Author (ESA)

N79-27385# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AEROSPACE PROPAGATION MEDIA MODELLING AND PREDICTION SCHEMES FOR MODERN COMMUNICATIONS, NAVIGATION, AND SURVEILLANCE SYSTEMS
May 1979 208 p refs AGARD Lecture Ser. held at London, 4-5 Jun. 1979; Boulder, Colo., 14-15 Jun. 1979
(AGARD-LS-99; ISBN-92-835-1322-3) Avail: NTIS HC A10/MF A01

Modelling and prediction schemes of the aerospace radio and optical propagation environment based on media characterization have become essential to meet requirements of operational accuracies in communication, navigation, and surveillance in military and civilian systems. The lectures included the following topics: (1) general modelling and prediction schemes; (2) aerospace (atmosphere, ionosphere, and the space environment) media-characterization; (3) short- and long-term prediction techniques across the RF and optical spectrum and agreement with observational data; (4) detection and communications through scattering channels; (5) adaptability of prediction techniques to radio and optical communication, navigation and surveillance systems operating in the aerospace environment; and (6) effects of geophysical disturbances on the state of the media and their predictability. For individual titles, see N79-27386 through N79-27393.

N79-27386# Appleton Lab., Slough (England).
PROPAGATION AT MEDIUM AND HIGH FREQUENCIES. 1: PRACTICAL RADIO SYSTEMS AND MODELLING NEEDS
P. A. Bradley *In* AGARD Aerospace Propagation Media Modelling and Prediction Schemes for Mod. Commun., Navigation, and Surveillance Systems May 1979 21 p refs (For primary document see N79-27385 18-32)
Avail: NTIS HC A10/MF A01

The principal phenomena associated with ground wave and sky-wave propagation at MF and HF are discussed. Particular consideration is given to transmission loss and coverage range, the dependence on ground-reflection properties, the state of the ionosphere and the earth's magnetic field. Regular temporal changes depending on time-of-day, season and solar activity, together with short-term fading are noted. The importance of antenna design in system operation is emphasized. Practical usage of the MF and HF bands is illustrated. Propagation parameters susceptible to modelling were reviewed, followed by an examination of requirements for long-term propagation models for system design, frequency allocation, and assignment. Short-term models are shown to be of potential value for frequency management, but the logistic difficulties of producing and disseminating results from these models are emphasized. J.A.M.

N79-27387# Institute for Telecommunication Sciences, Boulder, Colo. Performance Predictions and Model Development Group.
TRANSIONOSPHERIC RADIO PROPAGATION
Charles M. Rush *In* AGARD Aerospace Propagation Media Modelling and Prediction Schemes for Mod. Commun., Navigation, and Surveillance Systems May 1979 28 p refs (For primary document see N79-27385 18-32)
Avail: NTIS HC A10/MF A01

The effects of the earth's ionized atmosphere on radio waves that propagate through the ionosphere are reviewed. Emphasis is placed on transionospheric radio propagation systems and how their operational performance is impacted by the structure of, and changes in the structure of, the ionosphere. The normal ionosphere leads to refraction and slowing down of radio waves that propagate through it. This refraction and slowing down varies as the ionosphere itself varies. Irregularities in the ionospheric electron density can impart fluctuations or scintillations onto radio waves that pass through the irregularities. The morphological behavior of the ionospheric characteristics pertinent to transionospheric systems, as well as actual observations of these characteristics are discussed in terms of impact on system performance. Models that were developed to represent these characteristics under conditions of varying geophysical activity were also considered. J.A.M.

N79-27388# Air Force Geophysics Lab., Hanscom AFB, Mass.
MODELLING OF THE VISIBLE/INFRARED PROPAGATION ENVIRONMENT
Robert A. McClatchey *In* AGARD Aerospace Propagation Media Modelling and Prediction Schemes for Mod. Commun., Navigation, and Surveillance Systems May 1979 14 p refs (For primary document see N79-27385 18-32)
Avail: NTIS HC A10/MF A01

The pertinent atmospheric properties of temperature, pressure and constituent distribution are discussed. The AFGL atmospheric absorption line parameters compilation will then be described with emphasis on the accuracy of the data base and its application to high resolution propagation modelling. The necessity to deal with molecular continuum absorption and its relationship to absorption line formation are discussed. Knowledge and application of aerosol optical properties to the development of aerosol models are presented. Finally, the LOWTRAN atmospheric transmission model is described with emphasis on its accuracy, its applicability and its limitations. J.A.M.

N79-27389# Cologne Univ. (West Germany).
THE TRANSFER OF ELECTROMAGNETIC RADIATION IN THE TURBULENT ATMOSPHERE
E. Raschke *In* AGARD Aerospace Propagation Media Modelling and Prediction Schemes for Mod. Commun., Navigation, and Surveillance Systems May 1979 10 p refs (For primary document see N79-27385 18-32)
Avail: NTIS HC A10/MF A01

The principle properties of the terrestrial atmosphere are reviewed up to an altitude of about 50 km, with inclusion of general principles of theoretical models for the calculation of its motion fields. This is followed by a description of the transfer of electromagnetic radiation in the turbulent atmosphere and a brief outline of the general radiative transfer theory. J.A.M.

N79-27390# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
OPTICAL COMMUNICATION AND DETECTION THROUGH OPTICAL SCATTERING CHANNELS
Robert S. Kennedy *In* AGARD Aerospace Propagation Media Modelling and Prediction Schemes for Mod. Commun., Navigation, and Surveillance Systems May 1979 10 p refs (For primary document see N79-27385 18-32)
(Contract DAAG29-77-C-0048; Grant NSF ENG-78-21603)
Avail: NTIS HC A10/MF A01

The following were considered: (1) the effects of multiple scattering upon received signals; (2) the impact of these effects upon the performance of systems that were designed to operate in the absence of scattering; and (3) the essential features of systems that are best able to operate through channels in which the propagation is dominated by multiply-scattered radiation. A plausible, but incomplete, statistical model for the aperture field was introduced. The changes in the qualitative feature of the field with increasing scatter is reviewed. The performance degradation that systems designed for clear weather operation suffer in the face of increased scatter was noted as a prelude to a deeper discussion of the essential features and performance of systems that were designed to operate in multiple scattering atmospheres. J.A.M.

N79-27391# Norwegian Defence Research Establishment, Kjeller.
GEOPHYSICAL DISTURBANCE EFFECTS ON THE STATE OF THE PROPAGATION MEDIUM AND THEIR PREDICTABILITY
E. V. Thrane *In* AGARD Aerospace Propagation Media Modelling and Prediction Schemes for Mod. Commun., Navigation, and Surveillance Systems May 1979 24 p refs (For primary document see N79-27385 18-32)
Avail: NTIS HC A10/MF A01

Different types of disturbances in the upper atmosphere can change its properties as a propagation medium for electromagnetic waves. The most important of these disturbances are reviewed along with the possibility of predicting, not their actual occurrence, but rather their effect on the atmosphere once they have occurred. The review is based upon current knowledge of ionospheric and upper atmosphere physics, and concentrates on effects of importance to radio wave propagation. Both natural phenomena,

such as magnetic storms, and man-made disturbances are discussed. J.A.M.

N79-27392# Appleton Lab., Slough (England).
PROPAGATION AT MEDIUM AND HIGH FREQUENCIES. 2: LONG AND SHORT-TERM MODELS
P. A. Bradley *In* AGARD Aerospace Propagation Media Modelling and Prediction Schemes for Mod. Commun., Navigation, and Surveillance Systems May 1979 43 p refs (For primary document see N79-27385 18-32)
Avail: NTIS HC A10/MF A01

Procedures for the long-term estimation of sky-wave signal strengths at MF and HF as proposed by the CCIR are discussed. At MF an empirical fit to past measured signal data was used. Particular consideration was given to modelling the increased losses at auroral latitudes and the excess polarization-coupling loss on some-latitude paths. Sea-gain-enhancement allowances are also presented. Models at HF are shown to involve a detailed representation of the state of the ionosphere, idealized height distributions of electron concentration, an approximate means of raypath determination and separate allowances for the different factors contributing to the transmission loss. The degree of agreement with observational data achieved was illustrated for both frequency bands. The CCIR models for atmospheric, man-made and galactic noise were reviewed and examples presented of computer-based calculations. The use of statistical day-to-day signal and noise variability statistics to provide system performance estimates at HF was indicated. J.A.M.

N79-27393# Norwegian Defence Research Establishment, Kjeller.
PROPAGATION OF LONG RADIO WAVES IN THE EARTH'S ENVIRONMENT
E. V. Thrane *In* AGARD Aerospace Propagation Media Modelling and Prediction Schemes for Mod. Commun., Navigation, and Surveillance Systems May 1979 26 p refs (For primary document see N79-27385 18-32)
Avail: NTIS HC A10/MF A01

The antenna problem is discussed, then the propagation of the long waves in the waveguide formed by the earth's surface and the lower ionosphere is treated. Some of the most important computational methods available for predicting phase and amplitude of long waves are briefly described. The penetration of long waves into the sea is of importance for submerged vessels, and the physical principles of such penetration will be given some attention. The most important application of long waves is probably for navigation purposes. The major VLF and LF navigation systems in use will be described and their accuracy and limitations discussed. J.A.M.

N79-27849# Imperial Coll. of Science and Technology, London (England).
PULMONARY CIRCULATION AND MICROCIRCULATION
C. G. Caro *In* Von Karman Inst. for Fluid Dyn. Physiol. Fluid Dyn. Feb. 1971 4 p refs (For primary document see N79-27843 18-52)
Avail: NTIS HC A06/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N79-27394*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
BUCK/BOOST REGULATOR Patent Application
John Paulkovich and G. Ernest Rodriguez, inventors (to NASA) Filed 21 May 1979 24 p
(NASA-Case-GSC-12360-1; US-Patent-Appl-SN-041164) Avail: NTIS HC A02/MF A01 CSCL 09C

A voltage regulated dc to dc converter is presented which is operable over a wide range of input voltage including voltages greater or less than the desired output voltage. The converter uses an inductor and a capacitor as storage elements with the inductor being composed of two windings having a common junction. A transformer having a center tap connected to the common junction of the two windings of the inductor is connected at either end of its winding to ground through controlled switches. One winding of the inductor and either end of the transformer winding are connected by respective power diodes to the capacitor which supplies the output voltage to a load. The other winding of the inductor is connected to a fourth power diode as a clamping diode. Input voltage is supplied to the inductor through a third controlled switch. NASA

N79-27395*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
POWER CONVERTER Patent Application
James M. Black, inventor (to NASA) Filed 29 Jun. 1979 16 p
(NASA-Case-FRC-11014-1; US-Patent-Appl-SN-053652) Avail: NTIS HC A02/MF A01 CSCL 09C

The dc to dc converter described employs four transistor switches in a bridge to chop dc power from a source, and a voltage multiplying diode rectifying ladder network to rectify and filter the chopped dc power for delivery to a load. The bridge switches are cross-coupled in order for diagonally opposite pairs to turn on and off together using RC networks for the cross-coupling to achieve the mode of operation of a free running multivibrator, and the diode rectifying ladder is configured to operate in a push-pull mode driven from opposite sides of the multivibrator outputs of the bridge switches. The four transistor switches provide a squarewave output voltage which has a peak-to-peak amplitude that is twice the input dc voltage, and is thus useful as a dc-to-ac inverter. NASA

N79-27396*# Duke Univ., Durham, N. C. Dept. of Electrical Engineering.
A dc MODEL FOR POWER SWITCHING TRANSISTORS SUITABLE FOR COMPUTER-AIDED DESIGN AND ANALYSIS
Paul M. Wilson, Rhett T. George, Jr., Harry A. Owen, and Thomas G. Wilson 1979 9 p refs
(Grant NsG-3157)
(NASA-CR-158764) Avail: NTIS HC A02/MF A01 CSCL 09A

A model for bipolar junction power switching transistors whose parameters can be readily obtained by the circuit design engineer, and which can be conveniently incorporated into standard computer-based circuit analysis programs is presented. This formulation results from measurements which may be made with standard laboratory equipment. Measurement procedures, as well as a comparison between actual and computed results, are presented. M.M.M.

N79-27397*# Systems Science and Software, La Jolla, Calif.
EXTENSION, VALIDATION AND APPLICATION OF THE NASCAP CODE Final Report, 9 Sep. 1977 - 11 Jan. 1979
I. Katz, J. J. Cassidy, III, M. J. Mandell, G. W. Schnuelle, P. G. Steen, D. E. Parks, M. Rotenberg, and J. H. Alexander Jan. 1979 326 p refs
(Contract NAS3-21050)
(NASA-CR-159595; SSS-R-79-3904) Avail: NTIS HC A15/MF A01 CSCL 09C

Numerous extensions were made in the NASCAP code. They fall into three categories: a greater range of definable objects, a more sophisticated computational model, and simplified code structure and usage. An important validation of NASCAP was performed using a new two dimensional computer code (TWOD). An interactive code (MATCHG) was written to compare material parameter inputs with charging results. The first major application of NASCAP was performed on the SCATHA satellite. Shadowing and charging calculation were completed. NASCAP was installed at the Air Force Geophysics Laboratory, where researchers plan to use it to interpret SCATHA data. S.E.S.

N79-27398*# Systems Science and Software, La Jolla, Calif.
NASCAP USER'S MANUAL, 1978 Contractor Report, Sep. 1977 - Sep. 1978

J. J. Cassidy, III Aug. 1978 257 p refs
(Contract NAS3-21050)
(NASA-CR-159417; SSS-R-78-3739) Avail: NTIS HC A12/MF A01 CSCL 09C

NASCAP simulates the charging process for a complex object in either tenuous plasma (geosynchronous orbit) or ground test (electron gun source) environment. Program control words, the structure of user input files, and various user options available are described in this computer programmer's user manual. R.E.S.

N79-27399# Toulouse Univ. (France).
A STUDY OF THE CONDUCTION MECHANISMS IN THIN POLYMERIC FILMS WITH AN APPLICATION TO THE PASSIVATION OF SEMICONDUCTOR COMPONENTS Ph.D. Thesis [CONTRIBUTION A L'ETUDE DES MECANISMES DE CONDUCTION DAN LES FILMS MINCES DE POLYMERE. APPLICATION A LA PASSIVATION DES COMPOSANTS A SEMICONDUTEUR]
Yuan Segui 1978 314 p refs In FRENCH
Avail: NTIS HC A14/MF A01

The electrical properties of hexamethylsiloxane were studied to determine the capacitance-tension and capacitance-temperature characteristics of polysiloxane thin films. Both metal-polymer-metal and metal-polymer-semiconductor structures were used to investigate the nature of transport, density, and ionic polarization. Possible applications of thin polysiloxane films for the passivation of semiconductor components are examined. The qualities required for a passivation agent are reviewed and thin polymeric layers on silicon and gallium arsenide are compared. The structure of polymeric film and their synthesis by plasma discharge are also described. Transl. by A.R.H.

N79-27400*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN OF HIGH-PERVEANCE CONFINED-FLOW GUNS FOR PERIODIC-PERMANENT-MAGNET-FOCUSED TUBES
N. Stankiewicz Jun. 1979 17 p refs
(NASA-TP-1485; E-9729) Avail: NTIS HC A02/MF A01 CSCL 09C

An approach to the design of high perveance, low compression guns is described in which confinement is used to stabilize the beam for subsequent periodic-permanent-magnet focusing. The computed results for two cases are presented. A magnetic boundary value problem was solved for the scalar potential from which the axial magnetic field was computed. A solution was found by iterating between Poisson's equation and the electron trajectory calculations. Magnetic field values were varied in magnitude until a laminar beam with miniumum scalloping was produced. R.E.S.

N79-27401*# Public Technology, Inc., Washington, D. C.
LIGHTNING PROTECTION FOR TRAFFIC CONTROL SYSTEMS
J. Anderson Plumer (Lightning Technologies, Inc., Pittsfield, Mass.) and Keith E. Crouch (Lightning Technologies, Inc., Pittsfield, Mass.) 1978 58 p refs
(Contract NASw-3133)
(NASA-CR-158779) Avail: NTIS HC A04/MF A01 CSCL 09C

The probable cause of the several types of problems found related to lightning are determined. Protective measures were selected for each type of problem and the results are presented. M.M.M.

N79-27402# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE NONRECIPROCAL DIRECTIONAL FILTER, A MULTIPURPOSE FERRITE DEVICE
Rene Roberto Bonetti Mar. 1979 10 p refs
(INPE-1448-RPE/013) Avail: NTIS HC A02/MF A01

A ferrite device, the nonreciprocal directional filter (NDF) is proposed. Due to its tunability and selective properties the device can be successfully applied to channel separation, isolation, band elimination and as tuning element in agile microwave oscillators. Experimental data are presented illustrating the performance of a prototype NDF as a diplexer. Author

N79-27403# RCA Solid State Div., Somerville, N.J.
TOTAL-DOSE RADIATION-HARDENED CMOS INTEGRATED CIRCUITS Final Report, Oct. 1973 - Sep. 1977
S. Cohen Oct. 1978 65 p refs
(Contract N00014-74-C-0079)
(AD-A067975; PRRL-78-CR-44) Avail: NTIS HC A04/MF A01 CSCL 18/6

Processing techniques for fabricating CMOS LSI arrays with 1,000,000 rads (Si) total-dose radiation hardness were developed under this contract. Radiation-hardened processes for these technologies include bulk-silicon aluminum gate, bulk-silicon silicon-gate closed CMOS logic (C2L), and silicon-gate CMOS/SOS. Megarad total-dose hardness was demonstrated on several LSIs with silicon-gate technologies, such as the CDP1802 microprocessor and an 8-bit arithmetic logic unit (ALU). The total-dose and transient-radiation test results obtained with the ALU (TCS069) clearly demonstrated the advantages of combining radiation-hardened standard cell designs with radiation-hardened processing. These developments, funded under this contract, should dramatically increase the use of CMOS arrays in military weapons systems and spacecraft used in interplanetary explorations. Author (GRA)

N79-27404# Varian Associates, Palo Alto, Calif.
DESIGN OF AUTOMATIC TEST EQUIPMENT FOR DEVELOPMENTAL TWT'S Final Report
Michael J. Cascone Sep. 1978 17 p refs
(Contract F49620-77-C-0102)
(AD-A067553; AFOSR-79-0391TR) Avail: NTIS HC A02/MF A01 CSCL 14/2

Modern TWT's operate over a very wide range of power levels and frequencies. Measure of tube performance parameters therefore requires much equipment and time, as well as skilled personnel. Availability of these resources limits the amount and quality of testing that can be done. This report describes an automated system which can quickly, accurately, and fully test any TWT. Author (GRA)

N79-27405# Office of Naval Research, London (England).
FIFTH EUROPEAN SPECIALIST WORKSHOP ON MICROWAVE ACTIVE SEMICONDUCTOR DEVICES Conference Report
Irving Kauffman and A. K. Nedoluha 6 Mar. 1979 7 p
(AD-A067492; ONRL-C-1-79) Avail: NTIS HC A02/MF A01 CSCL 20/12

The report is a brief description of subjects discussed at a workshop attended by approximately fifty individuals engaged in work on microwave semiconductor devices and/or their use in circuits. Author (GRA)

N79-27406# TRW Defense and Space Systems Group, Redondo Beach, Calif.
MONOLITHIC MICROWAVE PREAMPLIFIER Technical Report, 1 Sep. 1977 - 31 Mar. 1978
D. Claxton, R. Kaelberer, and A. Benavides Oct. 1978 56 p refs
(Contract N00014-77-C-0645; RF5451001)
(AD-A063190) Avail: NTIS HC A04/MF A01 CSCL 09/5

A computer model of the FET has been developed based on the Pucel model, but with several improvements incorporated. The model has been exercised to produce FET designs, which will be optimized for low noise amplifier performance. The model also predicts device sensitivity to the processing variables, and provides S parameters as a function of frequency and bias. The model has been used to design devices for a low monolithic X-band preamplifier. Author (GRA)

N79-27407# Hughes Research Labs., Malibu, Calif.
CROSSED-FIELD CLOSING SWITCH DEVELOPMENT Final Report, 29 Jul. 1977 - 30 Sep. 1978
Robin Harvey Apr. 1979 64 p
(Contract DAAB07-77-C-2703; DA Proj. 1L1-62705-AH-94)
(AD-A068185; DELET-TR-77-2703-F) Avail: NTIS HC A04/MF A01 CSCL 09/1

The function of the crossed-field closing switch has been studied over a wide range of variables. It appears that the switch behavior is more complicated than originally expected. Three different modes of conduction have been observed: the conven-

tional crossed-field discharge, a hybrid hollow-cathode discharge, and vacuum arcs. Depending on the amplitude and duration of the current, conduction may typically pass through these modes in the above sequence. The crossed-field closing switch may be triggered magnetically or by grid control into a number of states with varying levels of voltage drop. Conduction may be allowed in the reverse direction or prevented. The present design is limited in response speed and repetition rate by the inductance of the grid and anode leads, the lack of efficient pressure control, and the need for a pulsed magnetic field. GRA

N79-27408# TRW Semiconductors, Inc., Lawndale, Calif.
MONOLITHIC 20W 2GHz TRANSISTOR AND MONOLITHIC 5W 4GHz TRANSISTOR Quarterly Report, 14 Sep. - 13 Dec. 1978
George Schreyer Feb. 1979 26 p
(Contract DAAB07-77-C-0431)
(AD-A068165; QR-6) Avail: NTIS HC A03/MF A01 CSCL 09/1

A lot of L-10 devices was fabricated and provided 8 watts in saturation, only 1 dB less the contract goal. A new passivation process was developed to provide an excellent etch mask against hydrazine. GRA

N79-27409# Army Electronics Research and Development Command, Fort Monmouth, N. J. Electronics Technology/Devices Lab.
STATIC AND DYNAMIC FREQUENCY: TEMPERATURE CHARACTERISTICS OF QUARTZ VIBRATORS
Arthur Ballato Apr. 1979 35 p refs
(DA Proj. 1L1-61101-A-91A)
(AD-A068630; DELET-TR-79-8) Avail: NTIS HC A03/MF A01 CSCL 09/1

The frequency-temperature (f-t) behavior of a crystal resonator depends upon temperature, and its spatial and temporal gradients. For quasi-isothermal changes, the static f-t curve can be used to determine frequency shifts that occur. The frequency then depends upon the parameters of the static f-t curve, the temperature range over which the oven cycles, and upon the oven setting point. The maximum frequency excursion has been computed for the AT and SC cuts of quartz in terms of these parameters, as a function of orientation angle. When oven cyclings, or other temperature perturbations occur at rates too rapid to be considered quasi-isothermal, additional non-negligible components of frequency shift are introduced. This effect is quantified by means of a simple model which is capable of predicting thermal transient effects for AT cuts. Simulations, using the model, disclose that sinusoidal temperature variations with periods of hours can lead to frequency instabilities much larger than would be expected using the static f-t curve. This effect should be greatly diminished in the vicinity of the SC cut. GRA

N79-27410# California Univ., Berkeley. Lawrence Berkeley Lab.
STUDIES OF PROTOTYPE HIGH-GAIN MICRO-CHANNEL PLATE PHOTOMULTIPLIERS
C. C. Lo and B. Leskovar 1978 10 p refs Presented at 1978 Nucl. Sci. Symp., Wash., D. C., 18-20 Oct. 1978
(Contract W-7405-eng-48)
(LBL-7957; Conf-781033-33) Avail: NTIS HC A02/MF A01

The characteristics of new prototype high gain photomultipliers having two microchannel plates in cascade for electron multiplication were investigated. Measurements are given of the gain, dark current, quantum efficiency, anode pulse linearity, electron transit time, single and multiphotoelectron time spreads, and pulse height resolution of the photomultipliers. The gain as a function of transverse magnetic field was measured and is discussed. Emphasis is put on the determination of optimum photomultiplier operating conditions, particularly with respect to their pulse height resolution capability. Photomultiplier characteristics as a function of input pulse repetition frequency were also investigated and discussed. DOE

N79-27411# General Electric Co., Pittsfield, Mass.
THREE-PHASE UHV ac TRANSMISSION RESEARCH Final Report
M. G. Comber, Herman M. Schneider, and Richard J. Nigbor Jul. 1978 314 p refs
(EPRI Proj. 68-2)
(EPRI-EL-823) Avail: NTIS HC A14/MF A01

A three-phase alternating current test line with line voltages up to 1500 kV was constructed and operated. The feasibility of UHV transmission was demonstrated and the most important problems impacting on cost and performance were identified. Design data on the corona performance of conductor and line configurations and on the dielectric strength of the external insulation of UHV transmission systems are given. DOE

N79-27412# Oak Ridge National Lab., Tenn.
ASSESSMENT OF LOAD MANAGEMENT ON THE ELECTRIC POWER SYSTEM
M. A. Kuliasha and David L. Mohre 1978 8 p Presented at the Joint Natl. ORSA/TIMS Meeting, Los Angeles, 13 Nov. 1978
(Contract W-7405-eng-26)
(CONF-781182-3) Avail: NTIS HC A02/MF A01

The load management program of the division of electric energy systems of the Department of Energy to research, develop, and demonstrate cost effective load management systems is described, and work that was completed is discussed. The program is designed to achieve a balance between near- and long-term electric energy system needs and national energy objectives. It includes the application of refined state-of-the-art analytical methods, technical demonstration of emerging technologies, and the development of advanced concepts and technologies for the future. DOE

N79-27413# Electricite de France, Paris. Div. Conversion Electrochimique.
EFFECT OF SILICATE IONS ON ELECTRODE OVERVOLTAGE [EFFET DES IONS SILICATE SUR LES SURTENSIONS D'ELECTRODES]
Jean-Marie Gras and Claude Seite Jun. 1977 10 p refs In FRENCH
(P/539/77/24) Avail: NTIS HC A02/MF A01

The influence of the addition of a silicate to a caustic solution (KOH) was studied in order to determine the degree to which silicates inhibit the corrosion of chrysotile under conditions of electrolysis at working temperatures of 100 C and above. In an alkaline solution containing various silicate concentrations current density was increased and electrode overvoltage was measured. Results show that silicate ion concentrations in the electrolyte increase with temperature without effecting electrochemical performance up to 115 C at 700 MA/sqcm. At this point the concentration is about 0.5 g Si/100g KOH. Beyond this limit electrolytic performance rapidly degenerates due to severe oxidation of the electrodes. Author (ESA)

N79-27414# Laboratoire Central de Recherches Thomson-CSF, Orsay (France).
InP AND GaAs SURFACE CHARACTERIZATION WITH VARIABLE STOICHIOMETRY OBTAINED BY MOLECULAR SPRAY. APPLICATIONS TO THE MANUFACTURE OF SCHOTTKY DIODES Final Report [ETUDE DE SURFACES DE PHOSPHURE D'INDIUM OBTENUES SOUS DIFFERENTES STOECHIOMETRIES PAR LA TECHNIQUE DES JETS MOLECULAIRES. APPLICATION A LA REALISATION DE BARRIERES DE SCHOTTKY]
J. Massies, N. T. Linh, J. Olivier, P. Faulconnier, and R. Poirier Aug. 1977 31 p refs In FRENCH
(Contract DGRST-76-7-0783-PE-808)
(LCR-2270-DK) Avail: NTIS HC A03/MF A01

Both InP and GaAs surfaces were studied in parallel. A molecular spray technique was used to obtain two semiconductor surfaces with different superficial compositions. The structures of these surfaces were examined by electron diffraction. Electron energy loss was measured spectroscopically in order to determine surface electrical characteristics. The results are used to support conclusions relative to the role of surface composition in establishing a Schottky barrier effect in semiconductor devices. Author (ESA)

N79-27415# Plessey Co. Ltd., Romsey (England).
COMPONENT MODELLING OF MICROWAVE TRANSISTORS Final Report
R. D. Mount, L. G. T. Hopkins, P. D. Cooper, and S. J. Hewitt

Paris ESA Sep. 1978 93 p refs
(Contract ESA-2733/76-NL-AK(SC))
(Rept-72/78/91-Issue-2; ESA-CR(P)-1170) Avail: NTIS HC A05/MF A01

Non-linear equivalent circuits for microwave transistors were studied by computer analysis. The work program included selection of suitable equivalent circuits, measurements of the circuit parameters, and experimental validation. Five different types of microwave transistors were characterized. In each case an experimental amplifier stage was constructed, and its performance compared with the results of nonlinear analysis. MODEL and TYPE descriptions of these transistors are given. Author (ESA)

N79-27416# Central Electricity Generating Board, London (England). Scientific Services Dept.
EDDY CURRENT PROBE GUN
P. G. Meier Dec. 1978 6 p
(TDB-312) Avail: NTIS HC A02/MF A01

This design permits the rapid testing of condenser tubes for defects. Advantages include rapid cycle operation, fewer components, split breech to allow on-site probe replacement, and simple linear layout to facilitate maintenance. Author (ESA)

N79-27417# Royal Signals and Radar Establishment, Christchurch (England).
A VOLTAGE CONTROLLED ACTIVE LOW PASS FILTER
R. C. Weston May 1978 23 p
(RSRE-78013; BR65965) Avail: NTIS HC A02/MF A01

The design of a low pass active filter of any desired order, in which the cutoff frequency is under the control of either a manual potentiometer or an active control potential, is described. The cutoff frequency can be arranged to operate a linear law with respect to the active control potential and can articulate at a rapid rate. Author (ESA)

N79-27418# Brown, Boveri und Cie, A.G., Lampertheim (West Germany).
PRESSURE CONTACT USE ON HIGH-POWER SEMICONDUCTOR DEVICES FREE OF THERMAL FATIGUE Final Report
Joachim Knobloch Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 30 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch u. Technol.
(BMFT-FB-T-78-02) Avail: NTIS HC A03/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 6,10

A procedure for manufacturing semiconductor power devices with pure pressure contact was developed in order to eliminate thermal fatigue. A silicon wafer, covered with a relatively thick metal layer is imbedded with the aid of a soft silver foil between two identically sized hard contact discs (molybdenum or tungsten) which are rotation symmetric. The advantages of this concept show up particularly for large diameters. This pure pressure contact was tested successfully in many devices in a large variety of applications. Author (ESA)

N79-27419# Siemens A.G., Erlangen (West Germany).
HIGH PRESSURE ARCS IN SF6. PART 1: FORMATION AND VELOCITY DISTRIBUTION OF VAPOR JETS AT THE ELECTRODES Final Report
Juergen Mentel Bonn Bundesmin. fuer Forsch. u. Technol. Sep. 1978 81 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol. 5 Vol.
(BMFT-FB-T-78-03-Pt-1) Avail: NTIS HC A05/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 16,80

A discharge system was developed to study various electrode materials. The various effects which are collectively described as the vapor jets were separated on graphite cathodes and individually investigated. It proved necessary to distinguish between the contributions to the arc, the vapor clouds generated from the electrode surface, and that of the vapor bursts ejected from within the electrode material. Spectroscopic measurements revealed that the vapor is cold relative to the arc plasma. A plasma velocity of 300 m/sec was measured while for the C2 vapor generated from the electrode surface it was 50 m/sec. The instability of the arc root observed when copious vaporization occurred is explained with the help of the ionic and electronic currents flowing to the cathode and anode, respectively.
Author (ESA)

N79-27420# Siemens A.G., Erlangen (West Germany).
HIGH PRESSURE ARCS IN SF6. PART 2: ENERGY TRANSPORT BY RADIATION Final Report
Harald Motschmann Bonn Bundesmin. fuer Forsch. u. Technol. Sep. 1978 56 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol. 5 Vol.
(BMFT-FB-T-78-04-Pt-2) Avail: NTIS HC A06/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 11,80

Quasi-stationary and ac arcs burning in a flow of high-pressure SF6 gas within a double nozzle system were investigated. Current density voltage pressure and the total emitted radiation up to currents of 35 kA were measured. The results obtained between the nozzles and at the nozzle exits show that, at constant pressure, the emitted radiation is approximately linearly dependent upon current up to 20 KA and 13 bar. At constant current the rate of increase of the proportionality factor decreases as the pressure rises. The radiation losses, the spectral distribution of which was also determined, are between 4% and 10% of the total power supplied. Author (ESA)

N79-27421# Siemens A.G., Erlangen (West Germany).
HIGH PRESSURE ARCS IN SF6. PART 3: INFLUENCE OF MAGNETIC FIELDS ON CIRCUIT BREAKER ARCS Final Report
Rudolf Gebel Bonn Bundesmin. fuer Forsch. u. Technol. Sep. 1978 58 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch u. Technol. 5 Vol.
(BMFT-FB-T-78-05-Pt-3) Avail: NTIS HC A04/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 12,20

The arc rotation characteristics for various electrode and magnetic field configurations in nitrogen and SF6 of variable pressure were examined with a veiw to the possible use of magnetically rotated arcs in switching arrangements. The two different switching systems that were closely examined are described. Results confirm that these switching arrangements have two main advantages. These are an arc chamber which can be of relatively simple design, since the arc-quenching gas need not have a pressure gradient, and increased contact life because of fast arc travel. Author (ESA)

N79-27422# Siemens A.G., Erlangen (West Germany).
HIGH PRESSURE ARCS IN SF6. PART 4: FIELD STRENGTH MEASUREMENTS IN BLOWN SF6-ARCS Final Report
Walter Hertz, Juergen Mentel, and Jan Stroh Bonn Bundesmin. fuer Forsch. u. Technol. 1978 41 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol. 5 Vol.
(BMT-FB-T-78-06-Pt-4) Avail: NTIS HC A03/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 8,40

Voltage measurements were performed in order to obtain information about the field strength in blown SF6 arcs. This parameter is closely related to power input as well as removal during the quenching process for circuit breakers. Test were done using dc in a cascaded channel, a double nozzle configuration for ac arcs up to 1000 A, and a double nozzle apparatus for ac arcs up to 20,000 A. The axial field strength was determined from arc voltage measurements for different positions of the probes. The discharge behavior at different current levels is discussed. Author (ESA)

N79-27423# Siemens A.G., Berlin (West Germany).
BASIC RESEARCH INTO THE LONG DURATION BEHAVIOR OF INSULATING MATERIALS IN SF6: INSULATED TRANSMISSION LINES. Final Report
Michael Crusius Bonn Bundesmin. fuer Forsch. u. Technol. Aug. 1978 106 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin fuer Forsch. u. Technol.
(BMFT-FB-T-78-09) Avail: NTIS HC A06/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 21,85

The influence of increased power frequency voltages, to some extent combined with increased temperature of vibration, on the life time of insulators were studied in pressurized SF6. Full size insulators made of several material combinations are investigated; this provides data for advanced designs of SF6-insulated substations and bus connections. The test setups are mainly positioned in a 1.8 mV outdoor testing field. The research program and results from long duration tests (up to 12,000 h) are reported. Author (ESA)

N79-27424# AEG-Telefunken, Heilbronn (West Germany).
ETCHING OF MICROPATTERNS OVER LARGE AREAS USING ELECTRON BEAM TECHNOLOGY Final Report
Juergen Hersener and Thomas Ricker Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 80 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-18) Avail: NTIS HC A05/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 16,80

A method for micropattern etching over large areas using electron beam technology is described. This method is based on suitable high speed digital processing of the beam in a modified scanning electron microscope. Electron resists were developed whose characteristics are given. The procedure for the determination of their sensitivities is described. The controlling procedure for the electron optical and mechanical components of the micro fabrication unit, including computer programs is reviewed. Capabilities of the system are given, and applications in semiconductor device technology are demonstrated.
Author (ESA)

N79-27425# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Chemie.
POTENTIALITIES FOR AN IMPROVEMENT OF THE EFFICIENCY OF FLUORESCENT MERCURY LAMPS Final Report
Klaus Hilpert Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 33 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-22) Avail: NTIS HC A03/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 6,75

A Knudsen cell-mass spectrometer system was designed and mounted to study the evaporation rates of mercury amalgam and their application to lamp efficiency improvement. With this instrument the evaporation of the compounds HgMg, Hg2Mg, Hg3Mg5, HgMg2, Hg2Mg5, and HgMg3 as well as of the alloys Hg1-In4-Mg1 was studied after appropriate samples were prepared and characterized. Hg-vapor pressures, reactions of evaporation, and thermodynamic functions are given. Results indicate that at least some of the alloys can be used in lamps.
Author (ESA)

N79-27426# Institut fuer Angewandte Festkoerperphysik der Fraunhofer Gesellschaft e.V., Freiburg im Breisgau (West Germany).
PASSIVATION OF HIGH VOLTAGE POWER DEVICES BY THERMAL OXIDATION Final Report
Max Schulz, Wolfgang Fahrner, and Richard Blaha Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 110 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-23) Avail: NTIS HC A06/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 23,10

High voltage power devices were passivated by thermal oxidation in a dry-wet process at 800 to 900 C. The leakage currents after passivation are less than 0.6/microA. The passivation process was tested p-n-p structures with negative and positive bevel angles and break-down voltages up to 5 kV and on complete thyristor structures. Complete passivation was obtained by an Al2O3-layer sputtered on top of the thermal SiO2-film. Metal contacts were prepared by evaporation of nickel. Bias and high-temperature stress tests show good stability of the passivated devices.
Author (ESA)

N79-27427# AEG-Telefunken, Heilbronn (West Germany).
INTEGRATED HIGH FREQUENCY CIRCUITS Final Report
Juergen Meyer Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 68 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-24) Avail: NTIS HC A04/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 14,10

High frequency circuits along with their associated geometries and a technique for monolithic integration were developed in order to produce suitable components for a high performance circuit design for use in a TV-video-IF amplifier. The two configurations were studied. In the 10 MHz range an integrated circuit with the characteristics of a gain controlled broadband amplifier, a demodulator for frequency modulated signals, and an output amplifier with equalized output voltage was tried. Mainly, no technology was used. In the MHz range the configuration developed and tested involved a video-IF broadband amplifier, a synchronous demodulator, and a video preamplifier especially developed for this application. Integrated component geometry was reduced and tests of the final circuit as built show good results.
Author (ESA)

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N79-27428 Rhode Island Univ., Kingston.
THE ROTATING HYDRAULICS OF STEADY FLOW IN OPEN CHANNELS Ph.D. Thesis
Colin Yunkang Shen 1978 201 p
Avail: Univ. Microfilms Order No. 7915470

Properties of steady flows in rotating open channels are investigated. The flow is studied using conservations of potential vorticity, Bernoulli function, and volume transport. It is found that three main types of flow can occur in the rotating channel; namely, the subcritical flow, the critical flow, and the supercritical flow. In addition, there are also rotation induced separated flows associated with each of the three types of flows. The criteria for identifying these different types of flows are determined for the constant potential vorticity case. Experiments are performed to verify some of the rotating channel flows, specifically the critical flow, the subcritical flow, and the supercritical separation. Possible applications of hydraulics to Norwegian overflows and the loop current in the Gulf of Mexico are discussed.
Dissert. Abstr.

N79-27429# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
UNSTEADY FLOWS IN AXIAL FLOW COMPRESSORS
1970 205 p refs Lecture held at Rhode-Saint-Genese, Belgium, 2-6 Feb. 1970
(VKI-Lecture-Series-20) Avail: NTIS HC A10/MF A01

The characteristics and measurement of unsteady flow in turbocompressors are discussed. Particular emphasis is given to the causes and effects of rotating stall. For individual titles, see N79-27430 through N79-27435.

N79-27430# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
ROTATING STALL IN AXIAL FLOW COMPRESSORS
Jean Fabri *In* Von Karman Inst. for Fluid Dyn. Unsteady Flows in Axial Flow Compressors 1970 43 p refs (For primary document see N79-27429 18-34)
Avail: NTIS HC A10/MF A01

If a simple theory of rotating stall in turbocompressors should be devised, the stall cells could be described as no-through flow bubbles and their speed of rotation deduced from the static pressure rise across the non-stalled blades. The radial equilibrium condition of the bubbles defines the critical flow rate at which a rotating stall may become steady. A calculation of the pressure rise in a solid body blading, friction and off design losses being taken into account, gives a correct description of the phenomenon. The steady flow regime lasts until, at high pressure ratio, the stall limit is not attained; the rotating stall regime corresponds to low flow coefficients and both regimes are stable in an intermediate flow coefficient range. In the case of a free vortex blading, the theory shows that the rotating stall cells extend over the blade span only, at least when the hub-to-tip ratio of the compressor is small.
A.R.H.

N79-27431# Cambridge Univ. (England).
UNSTEADY FLOWS
J. H. Horlock *In* Von Karman Inst. for Fluid Dyn. Unsteady Flows in Axial Flow Compressors 1970 24 p (For primary document see N79-27429 18-34)

Avail: NTIS HC A10/MF A01

Some fluid mechanic aspects of unsteady flow are considered, with a distinction being made between gross unsteadiness (e.g. a turbine subject to overall pressure fluctuations, as in a marine diesel engine supercharger), and blade to blade unsteadiness, (the fluctuating flow over an individual blade due to nearby blades moving past, creating wakes or potential flow variations or wakes entering the machine). Unsteady flow, work transfer and changes in stagnation enthalpy and stagnation pressure are discussed, the blade to blade problem is analyzed, and experimental and analytical work on the gross unsteadiness problem is described. A.R.H.

N79-27432# Cambridge Univ. (England).
UNSTEADY FLOW IN TURBOMACHINES
J. H. Horlock *In* Von Karman Inst. for Fluid Dyn. Unsteady Flows in Axial Flow Compressors 1970 7 p refs Presented at 3d Australian Conf. on Hydraulics and Fluid Mechanics, Sydney, Australia, 25-29 Nov. 1968 (For primary document see N79-27429 18-34)
Avail: NTIS HC A10/MF A01

The mechanism of change in stagnation pressure in a turbomachine is first examined. Thin aerofoil analyses, which are available for determining the fluctuating lift and circulation on aerofoils in unsteady flow, are reviewed. In particular the lift variations arising on aerofoils moving at uniform steady speed, through flows with perturbations parallel and perpendicular to the direction of uniform motion, are discussed. Author

N79-27433# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
EXPERIMENTAL TECHNIQUES FOR ANALYZING UNSTEADY FLOW IN REVOLVING MACHINERY [TECHNIQUES D'ANALYSE EXPERIMENTALE DES ECOULEMENTS INSTATIONNAIRES DANS LES MACHINE TOURNANTES]
Y. LeBot *In* Von Karman Inst. for Fluid Dyn. Unsteady Flows in Axial Flow Compressors 1970 55 p refs In FRENCH (For primary document see N79-27429 18-34)
Avail: NTIS HC A10/MF A01

Tests and fundamental research into the critical unsteady regimes in a rotating machine rely on the use of hot-wire anemometers, pressure gages, and extensometers in order to analyze fluctuations in the flow velocity and pressure, and to control the vibratory states of various parts of the machine. The principles and characteristics of the different techniques are described, and the results obtained on an experimental turbocompressor are presented. Transl. by A.R.H.

N79-27434# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
THE FUNCTIONING OF AXIAL COMPRESSORS WITHOUT ADAPTATION. THE UNCOUPLING BOUNDARY AND REVOLVING SEPARATION [FONCTIONNEMENT HORS ADAPTATION DES COMPRESSEURS AXIAUX. LIMITE DE DECROCHAGE. DECOLLEMENT TOURNANT]
Y. LeBot *In* Von Karman Inst. for Fluid Dyn. Unsteady Flows in Axial Flow Compressors 1970 19 p refs In FRENCH (For primary document see N79-27429 18-34)
Avail: NTIS HC A10/MF A01

The determination of conditions favorable for the appearance of rotating flow in axial machines must rest on a detailed understanding of their functioning without adaptation. The analysis of charge loss, characterized by the difference between experimental and theoretical values of the increase of total fluid pressure across the compressor, serves as the basis for analyzing this operation. The origin of the losses can be attributed to the friction on different moving elements in contact with the fluid, to the friction on the fixed walls limiting the vane, and to shock by nonadaptation of the incident flow. Some theoretical indications of nonadaptive functioning, and the possibility of predicting the boundary layer separation in the machine are examined. The predictions are applied to the first experimental results obtained on a moving wheel powered by an incompressible subsonic flow. Transl. by A.R.H.

N79-27435# Rolls-Royce Ltd., Derby (England).
AXIAL COMPRESSOR STALL
R. R. Moritz *In* Von Karman Inst. for Fluid Dyn. Unsteady Flows in Axial Flow Compressors 1970 56 p refs (For primary document see N79-27429 18-34)
Avail: NTIS HC A10/MF A01

Rotating stall is the direct cause of blade failures in resonant vibration as well as the indirect cause of mechanical problems due to the frequently associated duality in compressor behavior. The effects of compressor stall on aircraft engines are examined with emphasis on the mechanical properties of compressor blades, single stage stall, and multistage stall. A.R.H.

N79-27436*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AN EXAMINATION OF A GROUP-VELOCITY CRITERION FOR THE BREAKDOWN OF AN IDEALIZED VORTEX FLOW
Chon-Yin Tsai and Sheila E. Widnall (MIT, Cambridge) Jun. 1979 43 p refs
(NASA-TM-78541; A-7666) Avail: NTIS HC A03/MF A01 CSCL 20D

The phenomenon of vortex breakdown is believed to be associated with a finite amplitude wave that has become trapped at the critical or breakdown location. The conditions at which the propagating waves become trapped at a certain axial location were examined by use of a group-velocity criterion implied by Landahl's general theory of wave trapping. An ideal vortex having constant vorticity and uniform axial velocity at the inlet of a slowly diverging duct was studied. The linear wave propagation analysis is applied to the base flow at several axial stations for several values of the ratio of swirl velocity to axial velocity at the inlet of the divergent duct, assuming a locally parallel flow. The dipsersion relations and hence the group velocities of both the symmetric (n = 0) and asymmetric modes (n = + or - 1) were investigated. The existence of a critical state in the flow (at which the group velocity vanishes), and its relationship to the stagnation point on the axis of the duct and to the occurrence of an irregular singularity in the equations governing wave propagation in the flow field are discussed. S.E.S.

N79-27437# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
AGARD-VKI SHORT COURSE ON HYPERSONIC BOUNDARY LAYERS
Feb. 1969 555 p refs Lecture held at Rhode-Saint-Genese, Belgium, 24-28 Feb. 1969
(VKI-Lecture-Series-12) Avail: NTIS HC A24/MF A01

The course was presented to treat the subject of laminar and turbulent boundary layers with application of reentry vehicles. Because of the high flow energies involved, real gas effects as well as mass transfer resulting from the ablation of surface materials are important effects. Boundary layer problems and boundary layer equations are presented. Theoretical investigations and experimental data are also presented. For individual titles, see N79-27438 through N79-27447.

N79-27438# Naples Univ. (Italy).
DERIVATION OF THE BASIC EQUATIONS FOR NON-EQUILIBRIUM BOUNDARY LAYERS
L. G. Napolitano *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layers Feb. 1969 151 p refs (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

The equilibrium thermodynamics of composite systems among whose subsystems exchange of mass and of energy may take place are addressed. Upon the shifting-equilibrium hypothesis the point characterizing the state of the system is on a well defined hypersurface of an appropriate thermodynamic space, whose general properties are defined. Such a composite system may find itself in several possible conditions. Each condition corresponds to well defined loci of points on the hypersurface, whose relevant properties are discussed. Other properties of the system relevant to its evolution, such as its thermodynamic stability, and some classes of thermodynamic potentials are analyzed. Three thermodynamic models are constructed: (1) the ideal biatomic vibrating gas; (2) the ideal biatomic dissociating gas; and (3) the ideal biatomic dissociating and vibrating gas. G.Y.

N79-27439# Imperial Coll. of Science and Technology, London (England).
REACTING AND INTERACTING HYPERSONIC BOUNDARY LAYERS
N. C. Freeman *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layers Feb. 1969 40 p refs (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

Numerical analysis is given for the following topics: (1) reacting boundary layers; (2) boundary layers in the limit of high Mach number; (3) interacting boundary layers in plane flows (K=0); and (4) interacting boundary layers in axisymmetric flows (k=1). G.Y.

N79-27440# Aerodynamics Research Corp., Saratoga, Calif.
THE NUMERICAL SOLUTION OF THE NONSIMILAR LAMINAR BOUNDARY-LAYER EQUATIONS INCLUDING THE EFFECTS OF NONEQUILIBRIUM DISSOCIATION
N. A. Jaffe *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layers Feb. 1969 80 p refs (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

Numerical techniques are described for solving the partial differential equations governing the laminar boundary layer of an atom-molecule gas mixture in chemical nonequilibrium. The equations considered are valid for flow over arbitrarily-shaped two-dimensional or axisymmetric bodies. Initial value methods utilizing numerical-integration formulas and linearization techniques that make use of numerical finite-difference formulas are discussed. Computations of numerous cases over a wide range of flow conditions and comparisons with methods and experimental data established the accuracy and power of the methods discussed. G.Y.

N79-27441# General Electric Co., Philadelphia, Pa. Missile and Space Div.
HYPERSONIC BOUNDARY LAYERS
D. E. Nestler *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layers Feb. 1969 36 p refs (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

A lecture is presented which had the following objectives: (1) to present the basic equations for hypersonic laminar and turbulent boundary layers with ablation; (2) to review representative approaches to their solution; and (3) to review recent experimental results and show their implications relative to the accepted theoretical solutions or semi-empirical correlations. The emphasis throughout the lectures is placed on practical techniques for the prediction of aerodynamic heating, skin friction, and ablation for hypersonic flow conditions. Note is taken of the assumptions and compromises which are involved in obtaining tractable solutions or correlations. The principal uncertainities in the current state-of-the-art are indicated, and recommendations given for future research. G.Y.

N79-27442# General Electric Co., Philadelphia, Pa. Missile and Space Div.
DOWNSTREAM LAMINAR BOUNDARY LAYER WITH MASS ADDITIONS
D. E. Nestler *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layers Feb. 1969 22 p refs (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

The solution of the boundary layer equations becomes more difficult farther away from the stagnation point, due to the upstream effect on the local conditions at the point in question. Re-entry vehicle nose shapes are normally convex; for such configurations, the heat flux drops monotonically (with some exceptions) away from the stagnation point, due to the decreasing static pressure. Although the heat protection problem is less severe than at the stagnation point, accurate predictions of heat flux and ablative mass loss (or transpiration cooling) distributions are more critical downstream of the stagnation point, due to the larger surface area and weight involved. Developments of the last few years are reviewed and include the following topics: (1) melting and vaporization; (2) combustion and sublimation of graphite; (3) boundary layer development (including displacement thickness, skin friction, and heat flux); and (4) experimental results. G.Y.

N79-27443# General Electric Co., Philadelphia, Pa. Missile and Space Div.
BOUNDARY LAYER TRANSITION
R. J. Sullivan *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layers Feb. 1969 41 p (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

Present data, theory and empirical correlations on boundary layer transition are discussed. The problem of boundary layer transition on slender cones at high Mach numbers is emphasized. The initial portions of stability theory are addressed, and the general equations used for computing local conditions are shown. Some of the later data available on transition at hypersonic Mach numbers is analyzed. The phenomenon of transition is indicated by drag change, stability change, separation and increased aerodynamic heating. G.Y.

N79-27444# General Electric Co., Philadelphia, Pa. Missile and Space Div.
HYPERSONIC TURBULENT BOUNDARY LAYERS WITHOUT MASS ADDITION
D. E. Nestler *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layer Feb. 1969 30 p refs (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

A cursory review of some of the more recent theoretical and experimental studies of hypersonic turbulent boundary layers without mass addition is given. By use of selected data, theory comparisons, an attempt was made to indentify areas of greatest uncertainty. Recommendations are given of engineering procedures for current use, including suggested modifications. G.Y.

N79-27445# General Electric Co., Philadelphia, Pa. Missile and Space Div.
HYPERSONIC TURBULENT BOUNDARY LAYERS WITH MASS ADDITION
D. E. Nestler *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layers Feb. 1969 9 p refs (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

The introduction of mass transfer or blowing into the boundary layer, either by injection through a porous surface or slots, or by vaporization or decomposition of an ablating surface, causes a reduction in heat transfer and skin friction. A variety of theoretical approaches were employed to predict the effects of mass transfer into the compressible turbulent boundary layer; early approaches included the simple film theory or Couette flow model, and more detailed mixing length analyses. A review of theoretical and experimental data is given for the purpose of understanding the progress made in this area. G.Y.

N79-27446# General Electric Co., Philadelphia, Pa. Missile and Space Div.
ROUGHNESS PHENOMENA IN TURBULENT FLOW
D. E. Nestler *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layers Feb. 1969 7 p refs (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

Brief summaries are given of the effect of surface roughness on turbulent heat flux, skin friction, velocity profiles and cross-hatching phenomenon. G.Y.

N79-27447# General Electric Co., Philadelphia, Pa. Missile and Space Div.
ANALYSIS OF CHARRING ABLATORS
T. E. Shaw and P. B. Cline *In* Von Karman Inst. for Fluid Dyn. AGARD-VKI Short Course on Hypersonic Boundary Layers Feb. 1969 28 p refs (For primary document see N79-27437 18-34)
Avail: NTIS HC A24/MF A01

Ablative heat protection systems found wide use in entry system environments, from short range to long range ballistic entry vehicles, entry satellites, and for lifting entry vehicles of low L/D. The range of missions associated with the various entry systems listed result in a wide variation to environmental

conditions, from aerodynamic heating rates of less than 3-4 Btu sq ft sec for extended periods of time (on order of 2000 seconds) to very short, intense pulses of several thousand Btu sq ft sec with high levels of radiative heating from the entry vehicle shock layer system. It was found that no one ablative material represents a clear choice over all others for this range of environments; however, the char forming class of ablators appears to have the widest range of application. G.Y.

N79-27448# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
NUMERICAL METHODS IN FLUID DYNAMICS
1972 400 p refs Lecture held at Rhode-Saint-Genese, Belgium, 7-11 Feb. 1972
(VKI-Lecture-Series-44) Avail: NTIS HC A17/MF A01

Mathematical problems in fluid dynamics are solved. For individual titles, see N79-27449 through N79-27459.

N79-27449# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
NUMERICAL METHODS IN FLUID DYNAMICS, INTRODUCTORY REMARKS
J. Smolderen *In its* Numerical Methods in Fluid Dyn. 1972 14 p (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

The basic mathematical problems of fluid mechanics are reviewed. The various numerical techniques available to solve partial differential equations are presented, and their advantages and limitation discussed. S.E.S.

N79-27450# Optimal Analysis Co., Jersey City, N. J.
TIME DEPENDENT METHODS FOR MULTI-DIMENSIONAL COMPRESSIBLE FLOW PROBLEMS
Ephraim L. Rubin *In* Von Karman Inst. for Fluid Dyn. Numerical Methods in Fluid Dyn. 1972 48 p refs (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

Nonlinear phenomena and conservation laws, as applied to inviscid compressible hydrodynamic flows, are discussed. Techniques for solving multidimensional inviscid problems are presented. Methods for solving one and two dimensional Navier-Stokes equations are reported. S.E.S.

N79-27451# Los Alamos Scientific Lab., N. Mex.
THE MARKER-AND-CELL METHOD
Francis H. Harlow *In* Von Karman Inst. for Fluid Dyn. Numerical Methods in Fluid Dyn. 1972 38 p Sponsored in part by DOE (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

Marker and Cell (MAC) technique for computing time dependent, viscous, incompressible fluid flows in several space dimensions is described. The theoretical background, its properties, and some modifications of MAC are discussed. The method of solution and computer logic are presented. Results from actual calculations illustrate the applicability of the method. S.E.S.

N79-27452# Los Alamos Scientific Lab., N. Mex.
THE PARTICLE IN-CELL METHOD
A. A. Amsden *In* Von Karman Inst. for Fluid Dyn. Numerical Methods in Fluid Dyn. 1972 40 p Sponsored in part by DOE (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

The Particle In Cell method for the calculation of the dynamics of compressible fluids is presented. The calculation of pressures for all cells from cell value of mass, volume, and specific internal energy is discussed. Particles moving according to a scheme involving the cell velocities are reported. The total energy and mass of the system are checked for conservation and time dependence. S.E.S.

N79-27453# Los Alamos Scientific Lab., N. Mex.
A LAGRANGIAN METHOD FOR CALCULATING THE DYNAMICS OF AN INCOMPRESSIBLE FLUID WITH FREE SURFACE
C. W. Hirt, J. L. Cook, and Thomas Daniel Butler *In* Von Karman Inst. for Fluid Dyn. Numerical Methods in Fluid Dyn. 1972 15 p refs Repr. from J. Comput. Phys., v. 5, no. 1, Feb. 1970 p 103-124 Sponsored in part by DOE (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

A method for the numerical solution of the transient flow of viscous incompressible fluids having free surface is presented. The method is based on Lagrangian coordinates. Lagrangian coordinates permit the accurate treatment of fluid interfaces and free surfaces, and make it a simple matter to include the effects of surface tension. Several examples illustrate the properties of this new technique. S.E.S.

N79-27454# Los Alamos Scientific Lab., N. Mex.
A NUMERICAL FLUID DYNAMICS CALCULATION METHOD FOR ALL FLOW SPEEDS
F. H. Harlow and A. A. Amsden *In* Von Karman Inst. for Fluid Dyn. Numerical Methods in Fluid Dyn. 1972 10 p refs Repr. from J. of Comput. Phys., v. 8, no. 2, Oct. 1971 p 197-213 (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

A modified implicit continuous fluid Eulerian method is described, in which the procedure is simplified and the scope of applicability is greatly extended. In particular, the present modified form: (1) is applicable to arbitrary equation of state; (2) introduces a more meaningful variable for the Poisson equation; (3) reduces the finite-differences Poisson equation to a five-point form, with considerably simplified coefficients; (4) incorporates the correct, full viscous stress tensor, instead of artificial viscosity; (5) is time centered in such a way as to eliminate some undesirable low order truncation errors; (6) contains an optical mass diffusion term; (7) is applicable to free surface flows, as well as to those that are confined; and (8) can be used for both plane and cylindrically symmetric calculations. M.M.M.

N79-27455# Groningen Rijksuniversiteit (Netherlands).
THE SOLUTION OF NAVIER-STOKES EQUATIONS IN THE BOUNDARY LAYER
A. I. vandeVooren *In* Von Karman Inst. for Fluid Dyn. Numerical Methods in Fluid Dyn. 1972 65 p refs (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

A study for the simple case of flow along a semi-infinite flat plate is presented. A boundary value problem for the Navier-Stokes equation, which appears to describe the flow past the semi-infinite flat plate in the complete field was formulated. This formulation is exact. The approximation of the replacement of the partial differential equations by difference equations was introduced. Accurate results for the skin friction along the plate, for the drag and for the pressure distribution were presented. M.M.M.

N79-27456# Groningen Rijksuniversiteit (Netherlands).
COMPUTATION OF POTENTIAL FLOW AROUND BODIES
Adriaan Isak vandeVooren and E. F. F. Botta *In* Von Karman Inst. for Fluid Dyn. Numerical Methods in Fluid Dyn. 1972 23 p refs (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

An interpolation method, namely using splines, for two dimensional flows is presented. The potential flow was obtained as the superposition of an undisturbed flow and a flow generated by a doublet distribution at the wing surface and in the wake. M.M.M.

N79-27457# Hamburg Univ. (West Germany).
RECENT DEVELOPMENTS IN THE NUMERICAL TREATMENT OF PARTIAL DIFFERENTIAL EQUATIONS
L. Collatz *In* Von Karman Inst. for Fluid Dyn. Numerical Methods in Fluid Dyn. 1972 30 p refs (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

An update of some general numerical methods to solve nonlinear partial differential equations is presented as well as the domain of problems for which error estimates are found. M.M.M.

N79-27458# National Aerospace Lab., Amsterdam (Netherlands).
A SURVEY OF CURRENT COLLOCATION METHODS IN INVISCID SUBSONIC LIFTING SURFACE THEORY. PART 1: NUMERICAL ASPECTS
Theo E. Labrujere *In* Von Karman Inst. for Fluid Dyn. Numerical

Methods in Fluid Dyn. 1972 112 p refs (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

A survey of numerical and computational aspects of current versions of stationary inviscid subsonic lifting surface theories that are applied extensively to support aerodynamic research and development work concerning airplane configurations in parallel onset flow is given. M.M.M.

N79-27459# National Aerospace Lab., Amsterdam (Netherlands).
A SURVEY OF CURRENT COLLOCATION METHODS IN INVISCID SUBSONIC LIFTING SURFACE THEORY. PART 2: CALCULATIONAL ASPECTS OF SOLVING THE LARGE SYSTEMS OF LINEAR ALGEBRAIC EQUATIONS ON A DIGITAL COMPUTER
Arthur L. Bleekrode *In* Von Karman Inst. for Fluid Dyn. Numerical Methods in Fluid Dyn. 1972 25 p refs (For primary document see N79-27448 18-34)
Avail: NTIS HC A17/MF A01

The solution methods of the system of linear algebraic equations resulting from the collocation methods are discussed as well as the computer requirements and limitations in calculating these systems. M.M.M.

N79-27460*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SOME FLOW CHARACTERISTICS OF CONVENTIONAL AND TAPERED HIGH PRESSURE DROP SIMULATED SEALS
R. C. Hendricks 1979 18 p refs To be presented at the Joint Lubrication Conf., Dayton, Ohio, 16-18 Oct. 1979; sponsored by Am. Soc. of Lubrication Engr. and ASME
(NASA-TM-79192; E-064) Avail: NTIS HC A02/MF A01 CSCL 20D

The leak rates through shaft seals with large pressure drops were simulated using gaseous hydrogen, or nitrogen flowing through an annulus with a nonrotating centerbody. The flows were choked. For concentric or eccentric position of the rotor and parallel or convergent tapered flow passages, data and analysis revealed that mass flux or leak rate can be determined from a relation whose normalizing parameters depend on the thermodynamic critical constants of the working fluid and an average flow area expressed in terms of the inlet and exit cross-sectional areas. Using these normalized relations, the flow data for parallel and three convergent tapered shaft seal configurations are in good agreement. Generalization to any simple gas or gas mixture is implied and demonstrated. Author

N79-27461*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CONDENSATION ON A NONCOLLAPSING VAPOR BUBBLE IN A SUBCOOLED LIQUID
Kenneth J. Baumeister and Robert J. Simoneau 1979 17 p refs Prepared for 18th Natl. Heat Transfer Conf., San Diego, Calif., 5-8 Aug. 1979
(NASA-TM-79212; E-098) Avail: NTIS HC A02/MF A01 CSCL 20D

An experimental procedure is presented by which an estimate can be made of the condensation coefficient on a noncollapsing stationary vapor bubble in subcooled liquid nitrogen. Film boiling from a thin wire was used to generate vapor bubbles which remain fixed to the wire at their base. A balance was established between the evaporation in the thin annular region along the wire and the condensation in the vapor bubbles. J.M.S.

N79-27462*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A STUDY OF RESPONSE TIME OF PITOT PRESSURE PROBES DESIGNED FOR RAPID RESPONSE AND PROTECTION OF TRANSDUCER
J. A. Moore May 1979 32 p refs
(NASA-TM-80091) Avail: NTIS HC A03/MF A01 CSCL 20D

An eight orifice probe, designed to protect the transducer without the use of a baffle, was compared to a standard orifice-baffle probe in the small shock tube and in the expansion tube under normal run conditions. In both facilities, the response time of eight orifice probe was considerable better than the standard probe design. M.M.M.

N79-27463*# Tennessee Univ., Knoxville. Dept. of Engineering and Science Mechanics.
A SPLIT FINITE ELEMENT ALGORITHM FOR THE COMPRESSIBLE NAVIER-STOKES EQUATIONS Final Technical Report
Allen J. Baker 18 Jul. 1979 55 p refs
(Grant NsG-1529)
Avail: NTIS HC A04/MF A01 CSCL 20D

An accurate and efficient numerical solution algorithm is established for solution of the high Reynolds number limit of the Navier-Stokes equations governing the multidimensional flow of a compressible essentially inviscid fluid. Finite element interpolation theory is used within a dissipative formulation established using Galerkin criteria within the Method of Weighted Residuals. An implicit iterative solution algorithm is developed, employing tensor product bases within a fractional steps integration procedure, that significantly enhances solution economy concurrent with sharply reduced computer hardware demands. The algorithm is evaluated for resolution of steep field gradients and coarse grid accuracy using both linear and quadratic tensor product interpolation bases. Numerical solutions for linear and nonlinear, one, two and three dimensional examples confirm and extend the linearized theoretical analyses, and results are compared to competitive finite difference derived algorithms. S.E.S.

N79-27464*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
EXPERIMENTS ON THE STABILITY AND TRANSITION OF TWO-DIMENSIONAL AND THREE-DIMENSIONAL BOUNDARY LAYERS WITH SUCTION Final Report
William S. Saric and Gregory A. Reynolds Jul. 1979 71 p refs
(Grant NsG-1358)
(NASA-CR-157256) Avail: NTIS HC A04/MF A01 CSCL 20D

The preliminary experimental development work directed towards the understanding of transition in boundary layers with suction is presented. The basic stability experiment was established and the facility was certified. R.E.S.

N79-27465# Naval Postgraduate School, Monterey, Calif.
PRESSURE ON THE INTERFACE BETWEEN A CONVERGING FLUID WEDGE AND A FAST FLUID BOTTOM M.S. Thesis
Masami Kawamura and Ioannis Ioannou Dec. 1978 103 p refs
(AD-A067561) Avail: NTIS HC A06/MF A01 CSCL 20/4

The pressure amplitude and phase distribution along the interface between a tapered fluid layer and an underlying fast fluid bottom were investigated both theoretically and experimentally. Two different theoretical models were compared experimentally: a simple model based on a combination of normal modes and ray theory and an exact solution based on the method of images. The experiment was conducted at 100 kHz with a wedge of silicon oil separated from a large tank of fresh water by a thin Mylar diaphragm. The simple model failed to predict adequately the pressure amplitude and phase along the interface. The method of images gave accurate predictions. Author (GRA)

N79-27466# Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
A THEORY FOR PORTIONS OF THE ENERGY SPECTRUM AND FOR INTERMITTENCY OF FINE-SCALE TURBULENCE
Robert R. Long Apr. 1979 21 p refs
(Contract N00014-75-C-0805; Grants NSF OEC-76-18887; NSF ATM-76-22284)
(AD-A068743; TR-15-Ser-C) Avail: NTIS HC A02/MF A01 CSCL 20/4

The paper contains a theory for two ranges of the energy spectrum, k sub e $<<$K$<<$ k sub m and k sub m$<<$ k $<<$ sub s, where k is wave number, k sub e is the wave number of the energy-containing eddies, k sub m = 1/lambda where lambda is Taylor's microscale and k sub s = 1/eta where eta is the Kolmogorov length. The results are obtained by recognizing the existence of a mesoregion in wave-number space in which the wave number is of order 1/lambda and assuming a new inner

behavior of the spectrum function for larger k based on the two scales eta and lambda. Reynolds number similarity is assumed as a first approximation for smaller k (outer region) and an assumption that the mesoregion and the outer region overlap leads to infinite series for the spectrum function in each of the two ranges. The forms reduce to the k to the -5/3 power-law in both ranges in the omit as k/k sub e and k sub s/k get large. Universal constants may be chosen to yield excellent agreement with the data for a tidal channel. The paper concludes with some conjectures on the intermittency of fine-scale turbulence and the geometry of the fine structure. It is suggested that the intermittency factor is proportional to square root of 1/R sub lambda. Author (GRA)

N79-27467# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
COUPLED INTERACTIONS OF SHOCK-WAVE STRUCTURE WITH LAMINAR BOUNDARY LAYER IN IONIZING-ARGON SHOCK-TUBE FLOWS Interim Report
K. Takayama and W. S. Liu Mar. 1979 74 p refs
(Grant AF-AFOSR-3303-77)
(AD-A068869; UTIAS-233; AFOSR-79-0616TR) Avail: NTIS HC A04/MF A01 CSCL 20/4

Analyses are made of the mutual interactions between shock structure and the sidewall laminar boundary-layer and their effects on the quasi-steady flat-plate laminar boundary layer in ionizing argon shock-tube flows. The mutual interactions are studied using effective quasi-one-dimensional equations derived from an area-averaged-flow concept in a finite-area shock tube. The effects of mass, momentum and energy non-uniformities and the wall dissipations in the ionization and relaxation regions on the argon shock structure are discussed. The new results obtained for shock structure, shock-tube laminar sidewall and quasi-steady flat-plate boundary-layer flows are compared with dual-wavelength interferometric data obtained from utias 10 cm x 18 cm Hypervelocity Shock tube. GRA

N79-27468# Purdue Univ., Lafayette, Ind. Project SQUID Headquarters.
CARS INVESTIGATIONS IN SOOTING AND TURBULENT FLAMES Progress Report, 1 Oct. 1977 - 28 Feb. 1979
Alan C. Eckbreth Mar. 1979 67 p refs Prepared by United Technologies Research Center, E. Hartford, Conn.
(Contract N00014-75-C-1143; Proj. SQUID; NR Proj. 098-038)
(AD-A069169; SQUID-UTRC-5-PU) Avail: NTIS HC A04/MF A01 CSCL 21/2

Coherent anti-Stoke Raman spectroscopy (CARS) investigations in sooting, laminar and turbulent, propane-fueled diffusion flames are reported. For a 5320 A pump wavelength, using a frequency-doubled neodymium laser, interferences can occur at very high soot densities. For N2 CARS, there are both incoherent and coherent components to the interference. The incoherent interference arises primarily from anti-Stokes fluorescence from C2 excited by Stokes laser absorption. The C2 is created by the laser vaporization of soot particulates, shown to occur even on a nanosecond time scale. The coherent interference arises most probably from electronically-resonantly enhanced wave mixing in the C2. Fortunately, neither interference is very large. By proper experimental design, interference-free CARS spectra from flame N2 can be obtained even at high soot densities. CARS signatures from N2 have been employed to map the temperature field with high spatial precision throughout a small, luminous, highly sooting, laminar propane diffusion flame. Single pulse (approx. 10 nanosecond) CARS thermometry has been demonstrated in various regions of a highly swirled, turbulent propane diffusion flame. Based upon these investigations, CARS continues to appear very promising for diagnostic applications to practical combustion sources. GRA

N79-27469# Argonne National Lab., Ill.
TRANSIENT HEAT TRANSFER IN CONCRETE
L. Baker, Jr., F. B. Cheung, and J. D. Bingle 1978 11 p refs Presented at the Postaccident Heat Removal Inform. Exchange, Ispra, Italy, 10 Oct., 1978
(Contract W-31-109-eng-38)
(CONF-781079-4) Avail: NTIS HC A02/MF A01

The experimental method to study transient heat transfer in concrete was applied to three concretes of very different compositions. The similarity curves obtained for the three concretes were very much alike. Thermodynamic analysis was used to derive values of the effective volumetric specific heats. The analysis involved the development of idealized compositions to represent the concrete constituents in an approximate way. These were used in conjunction with experimental similarity curves to derive values of effective thermal conductivity for the three concretes which take into account the thermal effects of moisture migration. The results indicated that limestone and magnetite concretes are significantly more conductive at low temperatures than basalt concrete, although all three have values near 1 W/m-K at 700 C. DOE

N79-27470# Unilever, Plaine Saint-Denis (France).
AN ALGEBRAIC EXPRESSION FOR FIRST-ORDER REACTION IN LAMINAR FLOW
M. H. Hilder 1978 9 p refs Revised Submitted for publication
Avail: NTIS HC A02/MF A01

A simple algebraic expression for calculating the effect of a laminar velocity profile on the conversion of a reactant undergoing a first-order reaction in a tubular reactor was deduced. Results provide a sufficiently accurate approximation of the exact solution for most purposes, viz., C sub 0/0 = (1 + 0.25 ktau) e to the 0.5 ktau power + 0.25 ktau. This expression can be explained by considering the two limiting cases of high and low conversion. The success of this approach for laminar, Newtonian pipe flow suggests that it can also be applied to other geometrics and to non-Newtonian laminar flows. Author (ESA)

N79-27471# European Space Technology Center, Noordwijk (Netherlands). Structure and Thermal Control Div.
HEAT PIPE QUALIFICATION REQUIREMENTS
Jan. 1979 37 p
(ESA-PSS-49/TST-01-ESTEC) Avail: NTIS HC A03/MF A01

The requirements of a qualification program for heat pipe devices as components for use in spacecraft are specified. Satisfaction of the requirements set out in this specification should qualify the relevant device for a wide range of potential applications; the environmental levels quoted are consistent with this philosophy. The mechanical levels envelop the requirements for launch on Ariane, ThorDelta and the Space Shuttle. Qualification of constant conductance heat pipes variable conductance heat pipes, and heat-pipe diodes using working fluids consistent with operation at temperatures in the range 190 C to 200 C is discussed. Author (ESA)

N79-27472# Oxford Univ. (England). Dept. of Engineering Science.
FLOW THROUGH A FURROWED CHANNEL PART 1: CALCULATED FLOW PATTERNS
Ian J. Sobey 1978 50 p refs Sponsored jointly by Sci. Res. Council and Wolfson Found.
(OUEL-1273/78) Avail: NTIS HC A03/MF A01

A high efficiency membrane oxygenator is reported which utilizes pulsatile flow through furrowed channels to achieve high mass transfer rates. Numerical solutions of the time dependent two-dimensional Navier-Stokes equations were studied in order to show the structure of the flow through. Results show steady flow through a furrowed channel will separate provided the Reynolds number is sufficiently large. The effect of varying the Reynolds number and the geometric parameters is given. Comparison with solutions calculated using modern boundary layer theory show excellent agreement. Unsteady flow solutions are given as the physical and geometric parameters are varied. The structure of the flow patterns leads to an explanation of the high efficiency of the membrane device. Quasi-steady theory is shown to be incorrect if a separated region is present. In particular if the flow is decelerating a separated region will enlarge in distinct contradiction to the ideas of quasi-steady theory. Author (ESA)

N79-27473# National Engineering Lab., East Kilbride (Scotland). Applied Heat Transfer Div.
HEAT PIPES WITH HEADERS AND SINGLE AND TWO PHASE ARTERY SYSTEMS
D. Chilsholm Jul. 1978 27 p refs
(NEL-656) Avail: NTIS HC A03/MF A01

An artery and header system for use in heat pipes is described and the thermal/hydraulic design procedures developed. The artery system is simple, robust, and self-priming without the use of capillary arteries. Operation with single and two-phases fluids in the artery, when acting against gravity, is discussed. When in this orientation the axial load can exceed that in the horizontal plane and be more than ten-fold the unit without an artery. Author (ESA)

N79-27474# Research Inst. of National Defence, Stockholm (Sweden).
HSLAB: AN INTERACTIVE PROGRAM FOR ONE DIMENSIONAL HEAT FLOW PROBLEMS
Leif Abrahamsson (Uppsala Univ.), Bengt Haegglund, and Krister Janzon Jan. 1979 47 p refs
(FOA-C-20288-D6(A3)) Avail: NTIS HC A03/MF A01

An interactive computer program for treatment of the transient temperature development in a heated slab in one dimension is discussed. Users converse with the program via a computer terminal at the Stockholm Data Center. The program is adapted to the concepts of the user. The slab may be composed of one or several materials. The program accounts for the temperature dependence of the material parameters and various boundary conditions, e.g. prescribed temperature of heat transfer at the surface as a function of time. The numerical solution is based on difference approximations using Crank-Nicholson as the standard method. The computed results are given in graphic or tabular form. Two simplified models, inserted into the program, yield the temperature in a room or shelter exposed to fire and the temperature in a fire compartment. Author (ESA)

N79-27475# West Virginia Univ., Morgantown. Dept. of Mechanical Engineering and Mechanics.
PULSATILE FLOW THROUGH AN ORIFICE Final Report
R. A. Bajura, M. T. Pellergrin, K. R. Ferguson, and L. R. Farr Jan. 1979 105 p refs
(Grant NSF ENG-74-10399)
(PB-292194/8; NSF/ENG-74-10399-D) Avail: NTIS HC A06/MF A01 CSCL 02D

The flow metering error for a standard sharp-edged orifice installation under pulsatile flow conditions was determined. The main test facility utilized water as the working fluid and was constructed using a 4 inch diameter (10 cm) pipe for the metering run which was fitted with orifice with diameter ratios of 0.35, 0.50 and 0.70 compared to the diameter of the pipe. Velocity measurements near the orifice were obtained using hot film anemometers and a laser Doppler velocimeter. Differential pressure measurements were obtained with a variety of low and high frequency response instruments. The vortex shed from the orifice in pulsatile flow markedly distorts the downstream jet flow field. An analytical model was formulated based upon a traveling wave description of the motion of the vortex. Flow metering error predictions based upon this model are in good agreement with the experimental calibration tests which show that less fluid is discharged under pulsatile flow conditions than for steady flow at the same average differential pressure across the orifice. GRA

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N79-27476 Purdue Univ., Lafayette, Ind.
NEW DEVELOPMENTS FOR VIDICON-BASED uv-VISIBLE SPECTROMETERS Ph.D. Thesis
Ronald Michael Hoffman 1978 191 p
Avail: Univ. Microfilms Order No. 7914907

Potential applicability of the multi-level vidicon spectrometer presented to analytical problems was illustrated by the examination of three chemical systems involving lanthanide oxides, serum protein, and bromothymol blue. Data from the spectrometer coupled with a multiwavelength multicomponent simultaneous analysis technique resulted in a measured pKa of 7.05 for bromothymol blue and exhibited promise for the analysis of total serum protein levels in the presence of hemoglobin without a separate measurement procedure for the hemoglobin concentration. Dissert. Abstr.

N79-27477 North Carolina Univ. at Chapel Hill.
THE APPLICATION OF ION CONVECTION TO THE DEVELOPMENT OF AN ELECTRONIC SPIROMETER Ph.D. Thesis
Clifton Daniel Crutchfield, Jr. 1978 78 p
Avail: Univ. Microfilms Order No. 7914338

An electronic transducer based on the principle of ion convection was designed to measure forced expiratory flowrates. A parametric description of the ion transducer is presented, as well as an analysis of transducer response and theory. Potential effects related to substitution of a longer half-lived ion generation source of lower activity is investigated. The performance of the ion spirometer is evaluated with a standard water sealed spirometer and with a forced expiration simulator developed for the study. Conclusions are that the ion convection transducer shows great potential for adaptation in a portable, easily calibrated electronic spirometer capable of reliably measuring expired flowrates over a wide dynamic range. Negligible resistance to flow and automated data readout are other inherent features of the ion spirometer. Dissert. Abstr.

N79-27478*# Creare, Inc., Hanover, N.H.
DESIGN, DEVELOPMENT, AND TEST OF A LASER VELOCIMETER FOR A SMALL 8:1 PRESSURE RATIO CENTRIFUGAL COMPRESSOR Final Report
Francis X. Dolan and Peter W. Runstadler, Jr. Mar. 1979 206 p refs
(Contract NAS3-17860)
(NASA-CR-134781; Creare-TN-289) Avail: NTIS HC A10/MF A01 CSCL 14B

The instrument was designed as a diagnostic tool for the basic fluid dynamics of the inducer, impeller, and diffuser regions of this type compressor. The LV instrumentation was optimized to measure instantaneous velocities up to approximately 500 m/s, measured in absolute coordinates, within the rotating compressor impeller and in the two dimensional radial plane of the diffuser. Some measurements were made within the diffuser and the impeller inlet flows; however, attempts to make detailed measurements of the velocity field were not successful. Difficulties in maintaining high seed particle rates within the probe volume and the improper operation of the blade gating optics may explain the lack of success. Recommendations are made to further pursue these problems. At 100% speed the stage attained a total static pressure ratio of 7.5:1 at 75% total-static efficiency. Flow range from choke-to-surge was 6.8% of choking mass flow rate. Performance was lower than the design intent of 8:1 pressure ratio at 77% efficiency and 12% flow range. Detailed measurements of the stage components are presented which show the reasons for the stage performance deficiencies. S.E.S.

N79-27479*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
AUTOMATIC FLOWMETER CALIBRATION SYSTEM Patent Application
Raymond V. Lisle and Terry L. Wilson, inventors (to NASA) Filed 22 Jun. 1979 13 p
(NASA-Case-KSC-11076-1; US-Patent-Appl-SN-051274) Avail: NTIS HC A02/MF A01 CSCL 14B

A system for automatically calibrating the accuracy of a flowmeter includes a calculator capable of performing mathematical functions responsive to receiving data signals and function command signals. A prover cylinder which includes a piston is provided for measuring the temperature, pressure, and time required for accumulating a predetermined volume of fluid. Along with these signals, signals representing the temperature and pressure of the fluid going into the meter are fed to a number of data registers. Under control of a process controller, which includes a program counter, a programmable read only memory, and decoder logic system, the data registers are read out and the information is fed through a data select circuit to the calculator.

Command signals are also produced by a function select circuit and are fed to the calculator set indicating the desired function to be performed. The calculator set performs the calculation and generates a readout indicating the flow rate of the fluid. This reading is, then compared with the reading produced by the flowmeter. NASA

N79-27480*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EVALUATION OF MINIATURE SINGLE-WIRE SHEATHED THERMOCOUPLES FOR TURBINE BLADE TEMPERATURE MEASUREMENT
Raymond Hollanda Jun. 1979 20 p refs
(NASA-TM-79173; E-068) Avail: NTIS HC A02/MF A01 CSCL 09A

Chromel Alumel thermocouples were used, with sheath diameters of 0.15 and 0.25 mm. Tests were conducted at temperatures ranging from 750 to 1250 K. Both steady state and thermal cycling tests were performed for times up to 200 hours. Initial testing was performed in a low velocity gas stream for long time periods using a Meker-type burner. Additional testing was done in a high velocity gas stream for short time periods using a hot gas tunnel and also in a J75 jet engine. A total of eleven 0.15 mm diameter thermocouples and six 0.25 mm diameter thermocouples were tested. Drift rates up to 2.5% in 10 hours were observed. Photomicrographs show that this design is near the limit of miniaturization based on present manufacturing capabilities. Results indicate that the effects of miniaturization on reliability and accuracy must be considered when choosing thermocouples for a particular application. S.E.S.

N79-27481# Magnavox Government and Industrial Electronics Co., Fort Wayne, Ind.
MAGNETIC PARTICLES DISPLAY MATRIX-ADDRESS DEMONSTRATOR Final Report, Sep. 1976 - Jan. 1978
Lawrence L. Lee 7 Jan. 1977 37 p refs
(Contract N62269-76-M-4305)
(AD-A067642; NADC-76278-30) Avail: NTIS HC A03/MF A01 CSCL 14/2

A flat panel display has been fabricated using spherical magnetic particles sandwiched between two transparent glass plates.The particles are each half white and half black corresponding to opposite magnetic poles. A 10 by 15 electromagnetic element matrix has been fabricated to address the display. After uniform magnetization of the matrix elements, the polarity of elements is reversed with current supplied through microswitches closed by a punched card. The display plate placed over the matrix will display alpha-numerics in accordance with the program punched into the card. The alpha-numerics can be displayed either as white on a black background or a black on a white background. Author (GRA)

N79-27482# Research Support Instruments, Inc., Timonium, Md.
BALLOON BORNE ULTRAVIOLET SPECTROMETER Final Report, Apr. 1975 - 30 Sep. 1978
Robert F. Crabbs, Jr. and Edward F. Mackey 28 Dec. 1978 85 p
(Contract F19628-75-C-0154; AF Proj. 6687)
(AD-A067688; AFGL-TR-79-0008) Avail: NTIS HC A05/MF A01 CSCL 14/2

An ultraviolet spectrometer, featuring all Invar construction, with 0.1A resolution capability, was designed, built, and flown on a research balloon system. The spectrometer obtained high resolution spectra of the sun between 2000A and 3100A, at an altitude of approximately 40 km. Four launches were supported under this contract. Author (GRA)

N79-27483# Army Missile Research and Development Command, Redstone Arsenal, Ala. Technology Lab.
PERSHING 2 ALTERNATE ALTIMETER REPLACEMENT SCHEME
Robert Russell 28 Feb. 1979 37 p
(AD-A068168; DRDMI-T-79-34) Avail: NTIS HC A03/MF A01 CSCL 16/4

During captive flight tests of the PERSHING II(PII) at Huntsville, Alabama, in the summer of 1978, a special test was flown to determine if the Terrain Mapping Antenna (TMA) could be utilized as an altimeter. If the TMA could be used as an altimeter, then weight and cost could be reduced. Altimeter tests were run on flights AH 140 and AH 141, with AH 140 being the high-altitude TMA tests. This report discusses the high-altitude TMA tests and presents the data analysis, conclusions and recommendations. GRA

N79-27484# ARO, Inc., Arnold Air Force Station, Tenn.
EVALUATION OF A SELF-CALIBRATING SILICON BOLOMETER Final Report, 1 Oct. 1977 - 30 Sep. 1978
P. W. Below and F. G. Sherrell AEDC Apr. 1979 32 p refs
(AD-A068083; AEDC-TR-78-14) Avail: NTIS HC A03/MF A01 CSCL 14/2

A blackbody radiation source was used to evaluate a self-calibrating, phosphorous-doped silicon bolometer, with the objective of establishing an NBS-traceable calibration of the bolometer. The experimental results are inconclusive, since the response of the bolometer to its integral thin-film heater power was found to be linear and the response to the NBS-calibrated blackbody power was not linear. This discrepancy suggests the possible existence of a blackbody design problem. The problem should be resolved by repeating the calibration using another NBS-calibrated infrared source. GRA

N79-27485# Technische Physische Dienst TNO-TH, Delft (Netherlands). Optics Dept.
VELOCITY MEASUREMENTS USING A LASER DOPPLER VELOCIMETER ON BOARD SS TYDEMAN [SNELHEIDSMETINGEN MET EEN LASER DOPPLER SNELHEIDSMETER AAN BOORD VAN HR. MS. TYDEMAN]
A. H. vanKrieken and H. J. Raterink 17 Apr. 1978 20 p In DUTCH
(Contract A76/KM/016)
(TPD-1978-0-2; Rept-805.109; TDCK-70751) Avail: NTIS HC A02/MF A01

A short survey is presented of a study into the possibility of velocity measurements (of ocean currents) with the aid of a laser Doppler tachometer on board a ship. The laser tachometer works with backscattered light, and 600 nW argon ion lasers are used in the system. The optical system was carried out in such a way that the two velocity components could be measured simply in succession. Three different systems were on board for signal processing namely a frequency follower, a digital transient recorder and a digital photon correlator. All three systems could be coupled coupled via interfaces to a HP 9830 computer for further processing of the measurement data. The HP 9830 system was also used for calculating the position of the measured volume and the transfer constants for each measuring point. The position of the measured volume was adjustable from 0 to 2.5 m calculated from an optical window in the ship's bottom. The dimensions of the measured distance varying about 6 mm near the window to 28 mm at 2.5 m from the window. The transfer constant of window to about 31 kHz per m/s at a distance of 2.5 m from the window. F.O.S.

N79-27486# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
A BOLOMETER FOR 0.3 KELVIN [EIN BOLOMETER FUER 0.3 KELVIN]
Reinhard Katterloher Jul. 1978 169 p refs In GERMAN
(MPI-PAE/Extraterr-143) Avail: NTIS HC A08/MF A01

The bolometer system described is 3He cooled and employs an activated charcoal absorption pump. Ga and Sb doped germanium crystals are used. Low thermal capacity /low thermal conductivity material couples the crystal to the cold source. Phonon transport theory is used to investigate the characteristics of this coupling. Optical measurements were made using a 28 micrometer wavelength laser diode source. A suitable design incorporates a germanium crystal in direct contact with an indium layer coupled to the cold surface. At 0.3K measurements indicate a 650 microsecond time constant with an NEP of 4.5 X 10 to the -14th power W/(HZ to the -1/2 power). Author (ESA)

36 LASERS AND MASERS

Includes parametric amplifiers.

N79-27487 North Carolina State Univ. at Raleigh.
ANALYSIS OF DIRECT NUCLEAR PUMPED NOBLE GAS LASERS Ph.D. Thesis

Jerry Edward Deese 1978 136 p
Avail: Univ. Microfilms Order No. 7915525

The model presented is applied to the He-3-Xe laser excited by the He-3(n,p) H-3 reaction. Predictions of the model are compared with experimental characteristics of this laser over a range of pressure, neutron flux, and xenon fraction. The dominant pumping mechanism appears to be collisional recombination of the Xe(+) ion. Dissert. Abstr.

N79-27488# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
HIGH-POWER GAS LASERS, VOLUME 1
Mar. 1974 242 p refs Lecture held at Rhode-Saint-Genese, Beligum, 11-15 Mar. 1974
(VKI-Lecture-Series-65-Vol-1) Avail: NTIS HC A11/MF A01

An overview of the experimental, theoretical, and practical gas laser technology are examined as well as the physical processes that encompass gasdynamic, and chemical lasers, population inversions, shock tube tests, and optical cavities. For individual titles, see N79-27489 through N79-27490.

N79-27489# Maryland Univ., College Park.
GAS DYNAMIC LASERS: THEORY, EXPERIMENT AND THE STATE-OF-THE-ART
John D. Anderson, Jr. *In* Von Karman Inst. for Fluid Dyn. High-Power Gas Lasers, Vol. 1 Mar. 1974 164 p refs (For primary document see N79-27488 18-36)
Avail: NTIS HC A11/MF A01

The theoretical, experiment, and technical backgrounds of high energy gas lasers are examined. The directions where laser technology is growing, namely, gasdynamic, electric discharge, and chemical lasers are explored. M.M.M.

N79-27490# Southampton Univ. (England).
INTRODUCTION TO PHYSICS OF GAS LASERS
K. N. C. Bray *In* Von Karman Inst. for Fluid Dyn. High-Power Gas Lasers, Vol. 1 Mar. 1974 77 p refs (For primary document see N79-27488 18-36)
Avail: NTIS HC A11/MF A01

The physical processes leading to population inversion in gases are presented along with the optical cavity. Atomic and molecular lasers are discussed as well as the high frequency diffusion chemical lasers and the CO2-N2 gasdynamic lasers. M.M.M.

N79-27491# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
HIGH-POWER GAS LASERS, VOLUME 2
1974 275 p refs Lecture held at Rhode-Saint-Genese, Belgium, 11-15 Mar. 1974
(VKI-Lecture-Series-65-Vol-2) Avail: NTIS HC A12/MF A01

The performance of CO2 and CO lasers is examined. Continuous wave and pulsed chemical lasers are discussed as well as the potential applications of chemical lasers in industries, military operations, thermonuclear fusion, and isotope separation. For individual titles, see N79-27492 through N79-27494.

N79-27492# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
HIGH POWER ELECTRIC DISCHARGE LASER
Henri Brunet *In its* High-Power Gas Lasers, Vol. 2 1974 46 p refs (For primary document see N79-27491 18-36)
Avail: NTIS HC A12/MF A01

The factors affecting the performance of the CO2 and CO lasers are reviewed along with the current status of these lasers. M.M.M.

N79-27493# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
CHEMICAL LASERS
A. N. Chester and W. R. Warren *In its* High-Power Gas Lasers, Vol. 2 1974 201 p refs (For primary document see N79-27491 18-36)
Avail: NTIS HC A12/MF A01

High power chemical lasers, both continuous-wave stay and pulsed, including a brief discussion of the iodine photodissociation laser are presented. The basic types of chemical lasers are described, in terms of their internal mechanisms, their output characteristics, and their technology. The kinetics and fluid dynamics of the cw supersonic diffusion laser are discussed. Photographs of typical devices are presented and areas of current research interest are pointed out. The state of current theoretical modeling is summarized for the most important laser types. Some general considerations are given relating to the generation of short pulses and short wavelengths from chemical lasers, and the implications of these considerations with regard to current research directions are explored. Author

N79-27494# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
LASERS: THEIR APPLICATIONS AND OPERATIONAL REQUIREMENTS
I. J. Spalding *In its* High-Power Gas Lasers, Vol. 2 1974 26 p refs (For primary document see N79-27491 18-36)
Avail: NTIS HC A12/MF A01

Present and potential applications of high power gas lasers to such diverse areas as industrial systems (alignment, Raman scattering, Doppler velocimeters, materials processing, etc.), isotope separation, thermonuclear fusion, military applications, etc. are discussed. Different operational characteristics are required for various laser applications, and these are delineated. A brief introduction is given to the general characteristics of gas lasers, and of gas-dynamics, electrical and chemical methods of excitation. Author

N79-27495# California Univ., Berkeley. Electronics Research Lab.
STUDIES OF DISCHARGE EXCITED ORGANIC VAPORS FOR EFFICIENT LASER EMISSION Final Report, 1 Feb. 1975 - 30 Sep. 1978
T. K. Gustafson 30 Sep. 1978 5 p refs
(Grant DAHC04-75-G-0095)
(AD-A067512; ARO-12963.6-P) Avail: NTIS HC A02/MF A01 CSCL 20/5

The areas of dye vapor lasers, diagrammatic calculations of the density matrix and mode-locked flashlamp dye lasers have been pursued. The various results which have been obtained are summarized. Author (GRA)

N79-27496# Naval Research Lab., Washington, D. C. Chemistry Div.
STUDIES OF THE NAVY-ARPA CHEMICAL LASER (NACL) EXHAUST Final Report
J. J. Decorpo, R. C. Clark, J. K. Thompson, J. W. Hudgens, R. S. Okfky, and J. R. Wyatt 22 Dec. 1978 39 p refs
(AD-A068079; AD-E000290; NRL-8273) Avail: NTIS HC A03/MF A01 CSCL 20/5

Methods have been developed at NRL to sample the NACL exhaust. These methods include particulate, fluoride, and on-line mass spectrometric analysis. The only toxic gases detected were HF and DF. Their concentration in the final exhaust varied between 500 and 10,000 ppm. The particulate matter consisted of iron fluoride and iron oxide. Ten to fifteen percent of the fluorides and 85% of the particulate matter are removed by the pumps. GRA

N79-27497# Army Armament Research and Development Command, Dover, N. J. Large Caliber Weapon Systems Lab.
TWO-PHOTON RERADIATION FROM LASER PROTECTIVE MATERIALS
Kimball Kramer and Lloyd C. Bobb Aug. 1978 26 p refs
(AD-A068466; AD-E400199; ARLCD-TR-78046) Avail: NTIS HC A03/MF A01 CSCL 06/18

Several dyes used in laser protective devices were tested for reradiation in the 400 to 1000 nm wavelength region during and after irradiation by 17 nsec 1063 nm pulses of .23 + or - .08 J. A statistical analysis led to the conclusion that, in both back and forward scattering directions, less than 2 million photons were reemitted in this wavelength region (with 99% confidence limit). These may thus be incorporated into a plastic host for use as eye protection and may be considered safe up to a radiation level which will damage the plastic host material itself. GRA

N79-27498# California Univ., Berkeley. Lawrence Berkeley Lab.
CROSSED LASER AND MOLECULAR BEAM STUDY OF MULTIPHOTON DISSOCIATION OF C2F5Cl
D. J. Krajnovich, A. Giardini-Guidoni, A. S. Sudhoe, P. A. Schulz, Y. R. Shen, and Y. T. Lee Sep. 1978 5 p refs Presented at Conf. of the European Phys. Soc., Edinburgh, 20 Sep. 1978
(Contract W-7405-eng-48)
(LBL-8090; Conf-7809112-1) Avail: NTIS HC A02/MF A01

Rate constants for the photodissociation of C2F5Cl as well as the yield of C2F4 (+) were measured. The dynamics of the two dissociation channels was studied by measuring the angular and velocity distributions of the products. DOE

N79-27499# Technische Univ., Berlin (West Germany). Instit. fuer Luft und Raumfahrt.
CORRELATION TECHNIQUES AND OPTIMUM SIGNAL METHODS IN LASER OPTICS RADAR SYSTEMS AND PRACTICAL MEASUREMENT TECHNIQUE POSSIBILITIES [KORRELATIONSTECHNISCHE UND SIGNALOPTIMIERTEVERFAHREN DER LASEROPTISCHEN RADARORTUNG UND DEREN PRAKTISCHE ANWENDUNGSMOEGLICHKEITEN IN DER MESSTECHNIK]
Wolfgang Holzapfel 1978 100 p refs In GERMAN
(ILR-33; ISBN-3-7983-0634-6) Avail: NTIS HC A05/MF A01

A nonlinear interferometer is incorporated into a system using an extremely short pulse duration laser which measures distances more accurately then signal-propagation time processes. It was demonstrated that it is possible to measure distances and velocities (optically reflecting target) with the aid of a stochastic frequency modulated laser beam. When an optical electronic correlation receiver system is used in conjunction with an optimally modulated laser beam high accuracy can be obtained with poor signal to noise ratios. Author (ESA)

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N79-27500*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APOLLO TELESCOPE MOUNT: A PARTIAL LISTING OF SCIENTIFIC PUBLICATIONS AND PRESENTATIONS, SUPPLEMENT 3
John M. Reynolds, ed., Stanley A. Fields, ed., and William C. Snoddy, ed. Jun. 1979 43 p refs
(NASA-TM-78303) Avail: NTIS HC A03/MF A01 CSCL 13I

Compilations of bibliographies from the principal investigator groups of the Skylab solar observatory facility that gathered data from May 28, 1973, to February 8, 1974 are presented. The analysis of these data is presently under way. The publications listed are divided into the following categories: (1) journal publications; (2) journal publications submitted; (3) other publications; (4) presentations-national and international meetings; and (5) other presentations. M.M.M.

N79-27501*# National Aeronautics and Space Administration, Washington, D. C.
VIBRATION OF BEARINGS
K. M. Ragulskis, A. Yu. Jurkauskas, V. V. Atstupenas, A. Yu. Vitkute, and A. P. Kulvec 1979 395 p refs Transl. into ENGLISH of the book "Vibratsiya Podshipnikov" Vilna, Mintis Publishers, 1974 p 1-388 Original language document was announced as N78-22373 Transl. by Amerind Publishing Co. Pvt. Ltd., New Delhi Sponsored in part by NSF
(NASA-TT-F-679; TT-75-52090) Avail: NTIS HC A17/MF A01 CSCL 13I

The analytical determination of vibrations and friction torque due to rotation, taking into consideration the hydrodynamic action of a lubricating oil film, and the determination of the elastic and damping characteristics of bearings and bearing assemblies are presented. M.M.M.

N79-27502# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
STIRLING ENGINES
Feb. 1973 237 p refs Lecture held at Rhode-Saint-Genese, Belgium, 12-16 Feb. 1973
(VKI-Lecture-Series-53) Avail: NTIS HC A11/MF A01

Lectures are presented on the following topics: (1) advanced theory of the Stirling cycle digital simulation of regenerative engine operation - thermodynamic analysis of Stirling engines; (2) prospects for heavy/medium duty automotive Stirling engines; (3) development of a low cost heavy/medium duty automotive Stirling engine; (4) degrees of freedom in the layout of Stirling engines; and (5) unique requirements for the cooperation of computation and design in the development of Stirling engines. For individual titles, see N79-27503 through N79-27508.

N79-27503# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
STIRLING ENGINES
G. Walker *In its* Stirling Engines Feb. 1973 133 p refs (For primary document see N79-27502 18-37)
Avail: NTIS HC A11/MF A01

The following chapters are covered: (1) ideal thermodynamic cycle; (2) practical regenerator engine cycles; (3) theoretical analysis of Stirling cycle systems; (4) preliminary design; (5) mechanical arrangements; (6) regenerative heat exchangers in Stirling engines; (7) the Philips program; (8) applications of Stirling engines; (9) research topics; and (10) hints for design. G.Y.

N79-27504# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
ADVANCED THEORY OF THE STIRLING CYCLE DIGITAL SIMULATION OF REGENERATIVE ENGINE OPERATION
Theodor Finkelstein *In its* Stirling Engines Feb. 1974 17 p refs (For primary document see N79-27502 18-37)
Avail: NTIS HC A11/MF A01

A rigorous theory of operation and a comprehensive thermodynamic analysis employed in detailed computer studies is described. A complete set of equations is derived and applied to the digital computer solution of a practical machine. The analysis includes a correlation between mass flow and the heat transfer coefficient in the regenerator matrix, conduction in the regenerator matrix and all other heat leakage paths and many other refinements. G.Y.

N79-27505# United Stirling, A.B., Malmo (Sweden).
PROSPECTS FOR HEAVY/MEDIUM DUTY AUTOMOTIVE STIRLING ENGINES
S. Carlqvist *In* Von Karman Inst. for Fluid Dyn. Stirling Engines Feb. 1973 5 p (For primary document see N79-27502 18-37)
Avail: NTIS HC A11/MF A01

Any alternative to existing types of engines should be judged on a base of comparison with present and foreseen future requirements. Some of the basic requirements, such as noise reduction and emission control are briefly discussed. G.Y.

N79-27506# United Stirling, A.B., Malmo (Sweden).
DEVELOPMENT OF A LOW COST HEAVY/MEDIUM DUTY AUTOMOTIVE STIRLING ENGINE
K. Silverqvist *In* Von Karman Inst. for Fluid Dyn. Stirling Engines Feb. 1973 11 p (For primary document see N79-27502 18-37)
Avail: NTIS HC A11/MF A01

A Stirling engine with reduced dimensions and simplified specifications, that could be manufactured for low cost, was developed. The engine design goals were to reach the same dimensions as for a comparable diesel engine. The power chosen was 150 kW and the efficiency was the same as for the diesel engine. It was designed for medium and heavy duty applications in buses and lorries and, with some alterations, it could be used in boats. G.Y.

N79-27507# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
DEGREES OF FREEDOM IN THE LAYOUT OF STIRLING ENGINES
B. Feurer (Entwicklungsgruppe Stirlingmotor MAN-MWM, Augsburg, Germany) *In its* Stirling Engines Feb. 1973 28 p

(For primary document see N79-27502 18-37)
Avail: NTIS HC A11/MF A01

A Stirling engine design is analyzed with respect to only one factor being variable, while the other factors remain constant. This one variable factor is connection spaces. The spaces required for a Stirling engine are divided into three groups: (1) variable spaces of the cylinder in which work is being performed; (2) constant spaces of the heat exchanger required for the process; and (3) constant spaces due to engine design. The investigations show the influence exerted by the various loss groups on output and efficiency of Stirling engines. It is also shown that a shift of the maximum outputs towards larger phase angles is unavoidable. By a reference example, it is show the considerable limitations in the freedom of designing a Stirling engine. G.Y.

N79-27508# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
UNIQUE REQUIREMENTS FOR THE COOPERATION OF COMPUTATION AND DESIGN IN THE DEVELOPMENT OF STIRLING ENGINES
F. A. Zacharias (Entwicklungsgruppe Stirlingmotor MAN-MWM, Augsburg, Germany) *In its* Stirling Engines Feb. 1973 18 p (For primary document see N79-27502 18-37)
Avail: NTIS HC A11/MF A01

The following topics are discussed: (1) nature of Stirling engine development; (2) progress made with the Stirling engine; and (3) correlation between design and computation. G.Y.

N79-27509# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
NOISE IN TURBOMACHINES
1975 280 p refs Lecture Ser. held at Rhode-Saint-Genese, Belgium, 18-20 Jun. 1975
(VKI-Lecture-Series-81) Avail: NTIS HC A13/MF A01

The fundamentals of acoustic wave theory and noise generation, noise from industrial fans, noise nuisances and ECC regulations, and acoustic silencers for inlet and exhaust of turbomachinery are discussed. For individual titles, see N79-27510 through N79-27514.

N79-27510# Ecole Polytechnique, Paris (France).
A REVIEW ON FUNDAMENTALS OF ACOUSTIC WAVE THEORY AND NOISE GENERATION
G. H. Saurier *In* Von Karman Inst. for Fluid Dyn. Noise in Turbomachines 1975 27 p (For primary document see N79-27509 18-37)
Avail: NTIS HC A13/MF A01

The typical nature of sound, the theoy of wave propagation, and noise sources are discussed in turbomachinery. S.E.S.

N79-27511# Ecole Polytechnique, Paris (France).
NOISE FROM INDUSTRIAL FANS
G. H. Saurier *In* Von Karman Inst. for Fluid Dyn. Noise in Turbomachines 1975 32 p (For primary document see N79-27509 18-37)
Avail: NTIS HC A13/MF A01

The mechanisms of noise generation are identified. The strength of the sources to the physical parameters of the system are related. The problem of the way in which acoustic energy leaves the fan is studied. Noise generated by turbomachinery includes: (1) axial flow industrial fan noise; (2) centrifugal fan noise; (3) some effects of the environment on fan noise radiation; and aerodynamic rules for designing a quieter industrial fan. S.E.S.

N79-27512# Ecole Polytechnique, Paris (France).
GENERAL INTRODUCTORY REMARKS. A: NOISE FROM FLUID EJECTORS. B: PRESSURE FLUCTUATIONS GENERATED IN A CIRCUIT BY FLOW SINGULARITIES. C: USE OF CORRELATION TECHNIQUE TO NOISE SOURCE DETECTION PROBLEM
G. H. Saurier *In* Von Karman Inst. for Fluid Dyn. Noise in Turbomachines (For primary document see N79-27509 18-37)
Avail: NTIS HC A13/MF A01

The basic mechanisms of noise generation in situations and the acoustic power prediction by using basic geometric and aerodynamic parameters was examined. S.E.S.

N79-27513# Commission of the European Communities, Brussels (Belgium).
SOME REMARKS ON THE NOISE NUISANCES AND THE BASIS FOR FUTURE ECC REGULATIONS
J. J. Junger *In* Von Karman Inst. for Fluid Dyn. Noise in Turbomachines 1975 54 p refs (For primary document see N79-27509 18-37)
Avail: NTIS HC A13/MF A01

Criteria to establish the relation between exposure to the nuisance and detrimental effect is presented. Norms aimed at limiting or preventing the target exposure are discussed. The technical and scientific data considered to establish the criteria and fix acceptable levels of reception and emission are reported. S.E.S.

N79-27514# Sulzer Bros. Ltd., Winterthur (Switzerland).
ACOUSTIC SILENCERS FOR INLET AND EXHAUST OF TURBOMACHINERY
Y. N. Chen *In* Von Karman Inst. for Fluid Dyn. Noise in Turbomachines 1975 86 p refs (For primary document see N79-27509 18-37)
Avail: NTIS HC A13/MF A01

The elements of the acoustic silencers and different types of silencers are presented. Turbomachinery includes: (1) acoustic impedance of the acoustic panel with normal sound incidence; (2) damping of the acoustic panel in the duct; and (3) damping using mineral wool. S.E.S.

N79-27515*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN EVALUATION OF GREASE TYPE BALL BEARING LUBRICANTS OPERATING IN VARIOUS ENVIRONMENTS
E. L. McMurtrey Jul. 1979 24 p refs
(NASA-TM-78232; SR-4) Avail: NTIS HC A02/MF A01 CSCL 13I

Grease type lubricants in bearings were evaluated in five different adverse environments for a one year period. Four repetitions of each test were made to provide statistical samples. These tests were then used to select four lubricants for five year tests in selected environments with five repetitions of each test for statistical samples. Three five year tests were started in (1) continuous operation; (2) start-stop operation, with both in vacuum at ambient temperatures; and (3) continuous operation at 93.3 C. To date, in the one year tests, the best results in all environments were obtained with a high viscosity index perfluoroalkylpolyether grease. R.E.S.

N79-27516# Teledyne CAE, Toledo, Ohio.
CERAMIC MAINSHAFT ROLLER BEARING PERFORMANCE IN A GAS TURBINE ENGINE Final Report, Aug. 1976 - Nov. 1978
Glenn W. Hamburg and William F. Prusaitis Feb. 1979 40 p
(Contracts N00014-76-C-1104; MIPR-AMRDL-75-5)
(AD-A067904; TCAE-1623) Avail: NTIS HC A03/MF A01 CSCL 13/9

The program tests conducted on a modified J402 turbine engine were to demonstrate the feasibility of using ceramic bearings for high speed gas turbine applications with reduced or no lubrication to the bearing. Six engine tests were conducted, each test complementing the next to establish baseline parameters of the test to follow. Test No. 3 was the first to demonstrate the ceramic bearing operation unlubricated at 39,000 rpm and minimum lubrication of 10cc per minute at 41,200 rpm. Engine Test No. 4, which was a repeat of Test No. 3, was successfully completed and demonstrated 33 minutes of unlubricated operation at 39,000 rpm. All engine tests were conducted with the bearing and bearing housing instrumented for temperature read-out during the test. Engine Tests 3, 4, 5 and 6 were also instrumented for lubrication flow pressure and bearing cavity pressure in order to monitor lubrication to the bearing as a function of pressure differential. Author (GRA)

N79-27517# Harry Diamond Labs., Adelphi, Md.
DESIGN CONSIDERATIONS FOR IMPROVED FLUIDIC INPUT SERVOVALVE PERFORMANCE
Richard Deadwyler and Francis M. Manion Apr. 1979 29 p refs
(DA Proj. 1L1-61102-AH-44)

(AD-A068977; HDL-TM-79-4) Avail: NTIS HC A03/MF A01 CSCL 13/11

A study has been made to determine how the performance of two-stage fluidic input servovalves can be improved. The first stage of the servovalve consists of a fluidic amplifier that is coupled to set of input bellows, which in turn is coupled to a flapper nozzle valve, and the second stage consists of a sliding spool. At present, fluidic input servovalves have time constants of approximately 15 ms. This study is primarily concerned with determining the first-stage design changes needed to (1) obtain overall fluidic input servovalve time constants of 1 to 5 ms and (2) reduce leakage flow. Analysis of the first-stage flapper indicates that the servovalve time constant can be minimized by minimizing the area of the input bellows. The bellows area is the only first-stage servovalve parameter that can be changed to decrease the servovalve time constant without necessitating additional parameter changes. Moreover, minimizing the bellows area also reduces the leakage flow in the servovalve. GRA

N79-27518# McDonnell Aircraft Co., St. Louis, Mo.
EFFECT OF VARIANCES AND MANUFACTURING TOLERANCES ON THE DESIGN STRENGTH AND LIFE OF MECHANICALLY FASTENED COMPOSITE JOINTS Interim Report, 15 Feb. - 30 Jun. 1978
Samuel P. Garbo and J. M. Ogonowski Dec. 1978 97 p refs
(Contract F33615-77-C-3140)
(AD-A069170; AFFDL-TR-78-179) Avail: NTIS HC A05/MF A01 CSCL 13/5

The objective of this program is development of failure criterion and improved fatigue life prediction methodology of mechanically fastened joints in advanced composite structure. This report summarizes activity for the period 15 February 1978 to 30 June 1978. Program activities are divided into five tasks: Task 1 - Literature Survey; Task 2 - Evaluation of Joint Design Variables; Task 3 - Evaluation of Manufacturing and Service Anomalies; Task 4 - Evaluation of the Effect of Critical Joint Design Parameters on Fatigue Life; Task 5 - Development of Final Analyses and Correlation. This report documents Task 1 - Literature Survey activities. Summarized are the state-of-the-art in design and analysis of mechanically fastened composite joints, selected methodology, conclusions, and recommendations for the remainder of this program. GRA

N79-27519# Southwest Research Inst., San Antonio, Tex.
RELIABILITY OF STEAM TURBINE ROTORS Summary Report
C. H. Wells Oct. 1978 55 p refs
(EPRI Proj. 502)
(EPRI-NP-923-SY) Avail: NTIS HC A04/MF A01

An automated Steam Turbine Rotor Analysis Program (STRAP) was developed to facilitate the prediction of rotor lifetime given the duty cycle of the turbine and the results of ultrasonic examination from the rotor bore. STRAP consists in part of a preprocessor code that generates the boundary conditions and finite-element mesh for transient and steady-state temperature and stress analyses employing the ANSYS general-purpose structural analysis code. A postprocessor contains fracture toughness, stress-rupture, yield strength and fatigue crack growth rate data for air-melted 1 Cr-Mo-V forgings, on the basis of which the local stress and temperature values are screened to determine the critical crack size, the initial crack size that could grow to critical size within a specified number of hours or cycles and the minimum area fraction of defects which could link up to result in a significant crack. G.Y.

N79-27520# Battelle Columbus Labs., Ohio.
STEAM TURBINE ROTOR RELIABILITY: TASK DETAILS Interim Report
S. D. Brown, G. A. Clarke, T. S. Cook, J. W. Cunningham, J. R. Fox, M. J. Golis, L. D. Kramer, H. G. Pennick, T. T. Shih, R. J. Warren et al Nov. 1978 551 p refs Sponsored by Elec. Power Res. Inst. Prepared in cooperation with Southwest Res. Inst., San Antonio, Tex.; Westinghouse Res. and Develop. Center; and Westinghouse Elec. Corp., Philadelphia, Pa.
(EPRI Proj. 502)
(EPRI-NP-923) Avail: NTIS HC A24/MF A01

The viability of a steam turbine rotor component lifetime prediction system that is based on finite element thermo-elastic stress analysis and fracture mechanics, and that uses details of field NDE inspection results as input to the calculations was investigated. Tasks formed includes lifetime prediction analysis system, nondestructive evaluation, destructive tests, and material mechanical properties measurements. The automated Steam Turbine Rotor Analysis Program (STRAP) was developed to facilitate the prediction of rotor lifetime given the duty cycle of the turbine and the results of ultrasonic examination from the rotor bore. DOE

N79-27521# Department of Energy, Washington, D. C. Div. of Transportation Energy Conservation.
DIESEL ORGANIC RANKINE CYCLE COMPOUND ENGINE (BOTTOMING CYCLE) PROGRAM PLAN
Nov. 1978 41 p
(Contract EY-76-C-02-2832)
(DOE/CS-0052) Avail: NTIS HC A03/MF A01

A program plan is presented for implementation of a single vehicle test during fiscal year 1979 in which the diesel organic rankine cycle compound engine installed in a long-haul truck will be tested and evaluated as a precursor to future minifleet demonstration, the ultimate aim of which is the improvement of fuel economy in this class of truck. The single vehicle test consists of two major intertwined phases; the first consists of instrumentation and controls checkout followed by chassis dynamometer tests of the systems and road checkout tests. This is then followed by a series of tests during which all pertinent characteristics of the system will be ascertained. DOE

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N79-27522# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION OF ENGINE NACELLE STRUCTURE SEARCHING FOR CRACKS
L. X. Nepomuceno 7 Oct. 1976 23 p
(Rept-7610.909) Avail: NTIS HC A02/MF A01

The observed results of the ultrasonic inspection of the engine nacelle structure of five aircraft are reported. The 45 degree wedge showed better echoes in the thicker tubes and cracks were not detected in any of the inspected nacelles. M.M.M.

N79-27523# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
ULTRASONIC INSPECTION OF WING SPAR ATTACHMENT JOINTS AND LUGS IN VISCOUNT AIRCRAFT
L. X. Nepomuceno 6 Oct. 1976 7 p
(Rept-7610.910) Avail: NTIS HC A02/MF A01

The observed results of the inspection carried out according to PTL-97 of British Aircraft Corporation are presented. Author

N79-27524# Naval Postgraduate School, Monterey, Calif.
RELIABILITY CONTROL MODEL FOR STORED ITEMS REQUIRING REWORK M.S. Thesis
Paulo Antonio Ferreira Dec. 1978 117 p refs
(AD-A067560) Avail: NTIS HC A06/MF A01 CSCL 12/2

An application of control theory to an administrative problem is given for the case of a system of stored items which are periodically reworked to improve their reliability. Expressions are developed for the final value of the reliability when the system is stable and the limits of stability are found. A Kalman filter is used in the control model to ,obtain an estimation of the item reliability when there are random errors in the measurement and in the rework process. An extension is done for more than one dimension for systems composed of subsystems in series, parallel or a combination of both. A procedure for an optimal sequence of levels of rework is found in the sense of optimizing a linear combination of several performance measures. Numerical examples are presented to demonstrate the use of the several expressions. Author (GRA)

N79-27525# Southwest Research Inst., San Antonio, Tex.
NONDESTRUCTIVE TESTING INFORMATION ANALYSIS

CENTER, 1978 Annual Technical Report, 15 Feb. 1978 - 15 Feb. 1979
Richard T. Smith May 1979 37 p refs
(Contract DLA900-77-C-3733)
(AD-A068669; SWRI-15-4823) Avail: NTIS HC A03/MF A01 CSCL 05/2

During the reporting period, NTIAC's computerized data file grew to 15,318 records. The NTIAC Newsletter was distributed to over 4000 recipients. Ninety-nine inquiries (technical, bibliographic, and general) were responded to. Publications included a Critical Review on Liquid Crystals for Nondestuctive Evaluation and a State of the Art Survey on Automated Radiography. Drafts of a critical review on magnetic leakage methods and a state of the art survey on Barkhausen NDE have been prepared. GRA

N79-27526# Laboratorium fuer Betriebsfestigkeit, Darmstadt (West Germany).
INVESTIGATION INTO COMPUTING THE DISTRIBUTION OF FATIGUE LIFE BY MONTE-CARLO METHODS
H. P. Lehrke Mar. 1978 43 p refs In GERMAN; ENGLISH summary Sponsored by Deut. Forschungsgemeinschaft
(LBF-FR-138) Avail: NTIS HC A03/MF A01

Provided, that the individual fatigue life of specimens can be calculated as a function of parameters which describe their endurable strength and their loading, and provided, that the distributions of these parameters are known, the distribution of fatigue life can be computed by Monte-Carlo methods up to the tails of the distribution with high numerical accuracy. However, it is shown that the range of small probabilities to failure of the distribution is influenced mostly by the extreme values of the parameters. Therefore, their distributions must be known up to the tails in order to get results which can be used for a reliable prediction. Author (ESA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N79-27527 Illinois Univ. at Urbana-Champaign.
NUMERICAL AND SOFTWARE REQUIREMENTS FOR GENERAL NONLINEAR FINITE ELEMENT ANALYSIS Ph.D. Thesis
Robert Harvey Dodds, Jr. 1978 205 p
Avail: Univ. Microfilms Order No. 7913432

Application of the finite element method to nonlinear structural mechanics relies upon the classical formulations of nonlinear continuum mechanics and computer software to perform the numerical computations. The theoretical formulations are considered with emphasis placed on design and implementation of the computer software. The governing equations of nonlinear continuum mechanics are given in matrix notation familiar to most engineers. The classical equations of the Lagrangian description are cast into the finite element method. Specific matrices are given for deformation of a three-dimensional solid to illustrate the procedure. Software requirements of general purpose nonlinear finite element systems are discussed. A general purpose, user-oriented software system, FINITE, for static linear and nonlinear analysis is described. Dissert. Abstr.

N79-27528 Illinois Inst. of Tech., Chicago.
DISPLACEMENT AND STRAIN MEASUREMENT USING FOCUSED IMAGE HOLOGRAPHY Ph.D. Thesis
Surendra Kumar Chawla 1978 159 p
Avail: Univ. Microfilms Order No. 7913090

The holographic moire technique using Focused Image Holography was used to separate the displacement components. Focused Image Holography improved the quality of the holographic moire fringe pattern. The distinct advantage of reconstructing the Focused Image Holograms with white light reduces the speckle noise and thus makes the technique more feasible and practical. A detailed mathematical model of the Focused Image Holography is developed and various properties of white light reconstruction are derived. Dissert. Abstr.

N79-27529 State Univ. of New York at Stony Brook.
THE NUMERICAL SOLUTION OF SINGULAR INTEGRAL EQUATIONS AND APPLICATIONS TO MIXED BOUNDARY VALUE PROBLEMS OF FRACTURE MECHANICS Ph.D. Thesis
Apostolos Gerasoulis 1979 153 p
Avail: Univ. Microfilms Order No. 7914444

A discussion of the product integration method used for the numerical treatment of singular integral equations is presented. A mixed boundary value problem of two nonhomogeneous bonded half planes having an imperfection (crack) at the interface is considered as well as the effect of rigid inclusions in Griffith cracks at the interface of two bonded dissimilar elastic half planes. Computer programs which solve singular integral equations with logarithmic or Cauchy type kernels are given. Dissert. Abstr.

N79-27530 California Univ., Berkeley.
THE DIRECTIONAL STABILITY OF CRACK PROPAGATION Ph.D. Thesis
Ronald Dale Streit 1978 215 p
Avail: Univ. Microfilms Order No. 7914782

A centercracked specimen which allows to apply controlled length wise compression independently of the opening mode load was developed. An analysis of the specimen provided the value of r sub zero the geometrical constant as a function of the crack length. The value of r sub zero at instability was compared with the value r sub zero deduced from scanning electron microscopy for 7075-T651 aluminum. By applying sufficient lengthwise compression, the crack was made to grow straight and obtain numerous data points from this specimen which would otherwise be directionally unstable. As the total lengthwise tensile stress at the crack tip increases, the fracture toughness also increases. A geometry independent fracture toughness was obtained. Dissert. Abstr.

N79-27531*# National Aeronautics and Space Administration, Washington, D. C.
THE NASTRAN THEORETICAL MANUAL (LEVEL 16.0)
Mar. 1976 750 p
(NASA-SP-221(03)) Avail: NTIS HC A99/MF A01 CSCL 20K

The manual is a commentary on the NASTRAN computer program, introducing the program to all interested persons. The manual's most important function is to present the developments of the analysitcal and numerical procedures that underlie the program. This manual is one of the four manuals which document the NASTRAN computer program. R.E.S.

N79-27532*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRESS-INTENSITY FACTORS FOR INTERNAL SURFACE CRACKS IN CYLINDRICAL PRESSURE VESSELS
J. C. Newman, Jr. and I. S. Raju (Joint Inst. for Advan. of Flight Sci.) Jul. 1979 11 p refs Presented at 5th Structural Mech. in Reactor Technol. Conf., West Berlin, 13-17 Aug. 1979
(NASA-TM-80073) Avail: NTIS HC A02/MF A01 CSCL 20K

The stress intensity factors were calculated by a three dimensional finite element method. The finite element models employed singularity elements along the crack front and linear strain elements elsewhere. The models had about 6500 degrees of freedom. The stress intensity factors were evaluated from a nodal force method. An equation for the stress intensity factors was obtained form the results of the present analysis. The equation applies over a wide range of configuration parameters and was within about 5 percent of the present results. A comparison was made between the present results and other analyses of internal surface cracks in cylinders. The results from a boundary integral equation method were in agreement (+ or - 2 percent) and those from another finite element were in fair agreement (+ or - 8 percent) with the present results. M.M.M.

N79-27533# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.

EFFECTS OF GEOMETRIC VARIABLES ON STRESS INTENSITY FACTORS FOR CRACK GAGES M.S. Thesis - AFIT. Final Report

Menschem Carmon Feb. 1979 71 p refs
(AD-A068631; AFFDL-TR-79-3002) Avail: NTIS HC A04/MF A01 CSCL 01/3

A cracked metallic coupon, called crack gage, is being considered as a device for monitoring crack growth in aircraft structures. For this purpose, a stress intensity factor solution for the gage has to be known. This study provides stress intensity factor solutions for two basic geometric configurations subjected to prescribed displacements: 1. Edge cracked, trapezoidal shaped gages of uniform thickness. 2. Center cracked gages with varying or stepped thickness. For the trapezoid, the influences of changing the length of the cracked edge, while other edge remains constant, and vice-versa, were investigated. The results obtained do not show significant beneficial changes in stress intensity factor for the range of parameters considered over those of rectangular gages. Stress intensity factors were determined for stepped gages of various geometries. Various thickness ratios, length ratios and aspect ratios were considered, including the specific geometries of two gages now under development. In each case, the stress intensity factor was determined as a function of crack length. GRA

N79-27534# Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.

RESPONSE OF STRUCTURES TO DYNAMIC LOADING

Norman Jones Mar. 1979 81 p refs Presented at the Conf. on the Mech. Properties of Mater. at High Rates of Strain, Oxford, 28-30 Mar. 1979 Submitted for publication
(Contract N00014-76-C-0195; NR Proj. 064-510)
(AD-A068567; Rept-79-2) Avail: NTIS HC A05/MF A01 CSCL 20/11

This survey opens with some introductory comments on the response of structures subjected to large dynamic loads which cause plastic behavior. The rigid plastic method of analysis is then introduced, together with a few observations on the limitations and advantages of this simplified procedure. This is followed by a discussion of recent studies into the influence of transverse shear and rotatory inertia on the dynamic plastic stable response of beams and circular plates. The dynamic plastic buckling behavior of various structural members and an idealised model is then examined in section 4, and the review closes with a discussion and some concluding remarks. GRA

N79-27535# Oak Ridge National Lab., Tenn.

CYCLIC STRESS-STRAIN BEHAVIOR OF ERNiCr-3 WELD FILLER METAL

V. B. Baylor, M. K. Booker, J. P. Strizak, and R. L. Klueh 1978 44 p refs Presented at ASME Meeting, San Francisco, Calif., 10 Dec. 1978
(Contract W-7405-eng-26)
(CONF-781202-31) Avail: NTIS HC A03/MF A01

Analytical representations were developed for the fatigue life and cyclic stress-strain resonse of AWS A5.14 Class ERNiCr-3 as observed during strain controlled cycling at a strain rate of 0.004 over strain ranges from 0.35 to 3.0 percent at 23, 343, 538, and 593 C. Specific areas studied include fatigue life as a function of strain, cyclic hardening and softening during testing, development of cyclic stress-strain curves from stress-strain amplitude coordinates, and development of bilinear representations of cyclic stress-strain behavior as suggested by current advanced design techniques. At elevated temperatures, the fatigue life of ERNiCr-3 is reduced and the material cyclically hardens. At room temperature, some hardening due to cycling is displayed initially, followed by softening early in the test. The bilinear constants, E/sub m/ and C, are independent of temperature and strain rate, however, K/sub i/ is not. DOE

N79-27536# Engineering Sciences Data Unit, London (England). Fatigue Committee.

BOLTED JOINT FATIGUE PROGRAMME. VOLUME 1: STAGE 1, SECTIONS 1 TO 6

R. H. Sandifer Orpington, Engl. Defence Res. Inform. Centre May 1978 166 p refs 4 Vol.
(S/T-Memo-1/77-Vol-1; BR60444-Vol-1) Avail: NTIS HC A08/MF A01

Details of all the tests carried out in stage 1 of the Bolted Joint Fatigue Program are presented. The basic data derived from test results from a large number of bolted joint specimens are intended for use by designers and research workers. Joints were of the single pin form; aircraft materials were used, and a range of sizes, geometries, pin loads, stresses, and pin fittings were tested. Analyses of results and comparisons with existing data sheets are made. The report exists as two volumes. Author (ESA)

N79-27537# Engineering Sciences Data Unit, London (England). Fatigue Committee.

BOLTED JOINT FATIGUE PROGRAMME. VOLUME 2: STAGE 1, APPENDICES A, B, AND C

R. H. Sandifer Orpington, Engl. Defence Res. Inform. Centre May 1978 156 p refs 4 Vol.
(S/T-Memo-1/77-Vol-2; BR60445-Vol-2) Avail: NTIS HC A08/MF A01

Details of all the tests carried out in stage 1 of the Bolted Joint Fatigue Program are presented. The basic data derived from test results from a large number of actual bolted joint specimens are intended for use by designers and research workers. Joints were of the single pin form; aircraft materials were used and a range of sizes, geometries, pin loads, stresses, and pin fittings were tested. Analyses of results and comparisons with existing data sheets are made. The report exists as two volumes. Author (ESA)

N79-27538# Engineering Sciences Data Unit, London (England). Fatigue Committee.

BOLTED JOINT FATIGUE PROGRAMME. VOLUME 3: STAGE 2, SUPPLEMENTARY INVESTIGATIONS 1 TO 6

R. H. Sandifer Orpington, Engl. Defence Res. Inform. Centre May 1978 174 p refs 4 Vol.
(S/T-Memo-1/77-Vol-3; BR60446-Vol-3) Avail: NTIS HC A08/MF A01

During the development of the Bolted Joint Fatigue Program a number of supplementary investigations known collectively as stage two were carried out. Six of these investigations, refering to prestressing of holes, use of flat sided pins, preloading, transmission of load by clamping, hole edge chamfering, and variations in pin fit, respectively, are presented. Author (ESA)

N79-27539# Engineering Sciences Data Unit, London (England). Fatigue Committee.

BOLTED JOINT FATIGUE PROGRAMME. VOLUME 4: STAGE 2, SUPPLEMENTARY INVESTIGATIONS 7 TO 9

R. H. Sandifer Orpington, Engl. Defence Res. Inform. Centre May 1978 152 p ref 4 Vol.
(S/T-Memo-1/77-Vol-4; BR60447-Vol-4) Avail: NTIS HC A08/MF A01

During the development of the Bolted Joint Fatigue Program a number of supplementary investigations known collectively as stage two were carried out. Three of these investigations, refering to the effect of edge radiusing by press forming, stress corrosion and extending to lower stress levels some stage 1 tests, respectively, are presented. Author (ESA)

N79-27540# Centre Technique des Industries Mecaniques, St. Denis (France).

COLLECTED PRACTICAL DATA ON FATIGUE LIFE RESEARCH. ON THE INTERPRETATION OF FATIGUE TESTS UNDER COMBINED CONSTRAINTS Final Report [RECUEIL DE DONNES PRATIQUES DANS LE DOMAINE DE LA FATIGUE - SUR L'INTERPRETATION D'ESSAIS DE FATIGUE SOUS CONTRAINTES COMBINEES]

R. Sutterlin 16 Aug. 1978 119 p refs In FRENCH
(CETIM-1-1D-01-0) Avail: NTIS HC A06/MF A01

A wide range of materials (steels, metals, non-iron alloys) and forms (springs, gear teeth, bars, tubing, rods, etc.) were tested for their yield strengths under both symmetric and nonsymmetric load cycles in order to develop a generalized method for determining fatigue life. Traction, compression, bending, and torsion tests were used. Vessels of various shapes were also tested under internal pressure. Results indicate that fatigue life behavior in a given stress mode cannot necessarily be extrapolated to predict behavior in other modes. A theoretical explanation of logarithmic graphs illustrating materials behavior is discussed. It

is noted that fatigue life decreases for given materials under pressure as compared to the unpressurized state due to corrosion by the pressurizing liquid (oil). Author (ESA)

N79-27541# Centre Technique des Industries Mecaniques, St. Denis (France).
ON THE CALCULATION OF YIELD STRENGTH FOR VARIOUS ASSEMBLIES Final Report [CALCUL DE RESISTANCE DE QUELQUES ASSEMBLAGES]
J. Chalier Sep. 1978 57 p refs In FRENCH
(CETIM-1-1G-06-0) Avail: NTIS HC A04/MF A01

A pratical method for determining the yield strengths of different assembling techniques (shrink-fitting; bolting; bonding) was developed. For each case a theoretical description of the calculations, a specific example of the calculations use suitable for application by engineering consultants, and a short bibliography are given. In the case of shrinkfitting, rupture strength tests for shrink-fit assemblies under torsional stress are cited comparing yield strength with the type of contact surface (direction and roughness of factory scoring). Although different bonding techniques are discussed, the exact mechanical properties of the bonding agents studied are not yet known. Author (ESA)

N79-27542# Oxford Univ. (England). Dept. of Engineering Science.
THE BUCKLING OF SHORT TUBES UNDER EXTERNAL PRESSURE
W. S. Hemp 1978 10 p
(OUEL-1258/78) Avail: NTIS HC A02/MF A01

Donnel equations and variational principles were used to establish analysis. It is shown that the appropriate boundary conditions for a free edge are those obtained from the membrane stress results and not those for bending moments and effective bending shear stress results. Expressions for the buckling pressure and the number of circumferential half waves are given as functions of shell thickness, radius, length, Young modulus, and Poisson ratio. Author (ESA)

42 GEOSCIENCES (GENERAL)

N79-27543# NATO Committee on the Challenges of Modern Society, Brussels (Belgium).
PROCEEDINGS OF THE NINTH INTERNATIONAL TECHNICAL MEETING ON AIR POLLUTION MODELING AND ITS APPLICATION
Christa Morawa, ed. 1978 650 p refs Meeting held at Toronto, Canada, 28-31 Aug. 1978
(Rept-103) Avail: NTIS HC A99/MF A01

Application of air quality models is discussed. Specific topics covered include: modeling for complex terrain; dispersion coefficients and turbulence characterization; new modeling techniques; model validation; and requirements for data. For individual titles, see N79-27544 through N79-27596.

N79-27544# Flow Research, Inc., Kent, Wash.
PHYSICAL MODELING OF PLUME DISPERSION IN COMPLEX TERRAIN: NEUTRAL AND STABLE ATMOSPHERE c45
H. T. Liu and J. T. Lin *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 3-15 refs (For primary document see N79-27543 18-42)
(Contracts EPA-68-02-1293; EPA-68-02-1294)
Avail: NTIS HC A99/MF A01

Experiments were conducted in a towing tank to simulate plume dispersion in a complex terrain under both neutral and stable atmospheric conditions. Two terrain models were used simulating the plume dispersion from the ASARCO Lead Smelter in Glover, Missouri, and from the Kennecott Copper Smelter in Garfield, Utah. Results of flow visualization in both still and motion pictures are presented to demonstrate the realism of laboratory simulation and the effects of stability and complex terrain on the dispersion of a plume released from a smoke stack. These effects, which are often observed under stable atmospheric conditions, include the thin ribbon formation of the plume, deflection of the plume by downslope winds and by flow blocking in the presence of large mountains, and channeling of the plume along valleys. J.M.S.

N79-27545# North American Weather Consultants, Goleta, Calif.
VALLEY CIRCULATION INFLUENCE ON TALL STACK DISPERSION FROM A RIDGE LOCATION c45
Einar L. Hovind, Timothy C. Spangler, Nicholas E. Graham, and Peter G. Sagert (British Columbia Hydro and Power Authority) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 17-26 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Several plume simulation tracer studies were conducted as part of a comprehensive fossil fuel plant siting evaluation in mountainous terrain. The complex plume transport and diffusion processes observed are described. The existence of a cellular air-mass motion as a result of the differential heating in the valleys is documented. J.M.S.

N79-27546# North American Weather Consultants, Goleta, Calif.
A METHOD OF COMPUTING MAXIMUM GROUND-LEVEL CONCENTRATIONS OF SO2 UNDER PROLONGED STAGNATION CONDITIONS c45
Einar L. Hovind, Max W. Edelstein, and Darryl G. Paulson *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 27-35 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

A technique is described for computing the maximum ground level concentration of SO2 due to emissions from coal-fired power plants under prolonged stagnation conditions. Factors discussed in the method include wind/mixing height values based on studies of prolonged stagnation conditions, variation in the mixing volume with time, and critical values of SO2 half-life. The worst case episode is computed by combining the maximum 24-hour concentration on the last day of the episode with the background concentration due to emission buildup from the beginning of the stagnation episode. The resultant computations provide values of relative concentration as a function of distance from the source. Author

N79-27547# Warren Spring Lab., Stevenage (England).
DISPERSION FROM CHIMNEYS DOWNWIND OF CUBICAL BUILDINGS: A WIND-TUNNEL STUDY c45
C. F. Barrett, D. J. Hall, and A. C. Simmonds *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 37-44 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The aerodynamic influence of a cubical building, with its front face at 45 deg to the oncoming flow, on the dispersion from downwind chimneys was studied in a wind tunnel. Although the larger effects disappear within a few building heights the influence is still evident at distances as great as 24 building heights. It is suggested that this is due to a persistent weak swirling flow. J.M.S.

N79-27548# Calgary Univ. (Alberta). Dept. of Chemical Engineering.
FIELD INVESTIGATIONS OF THE DISPERSION OF POLLUTION ACROSS A RIDGE c45
S. F. Benjamin, J. J. Havlena, and R. D. Rowe *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 45-54 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

A field program was conducted around a sour gas processing plant in Alberta to ascertain the effect of a ridge, situated close by, on the emissions from the plant. A series of tetroon flights were performed during the summer of 1977. Large instabilities were observed during windy neutral atmospheric conditions as well as on days with strong thermal convection. The instabilities extended to several hundred meters above the ground, and were an order of magnitude greater than the height variations of the

underlying terrain. Under more stable conditions the air flow was observed to reflect the structure of the terrain more closely. J.M.S.

N79-27549# Atmospheric Environment Service, Downsview (Ontario).
MODELLING THE EFFECT OF SEPARATED WAKES BEHIND HILLS AND BUILDINGS ON POLLUTANT DISPERSION **c45**
J. S. Puttock *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 55-67 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Models of the concentration distribution due to sources near obstacles with separated wakes are described. Analytical solutions of the diffusion equation are made possible by assuming an eddy diffusivity and potential flow external to the recirculating region, and uniform concentration, C sub w, within that region. The results lead to an estimate which approximates C sub w by the average of the concentration calculated on the recirculating wake boundary if this boundary were impervious. It is also suggested that pollutant distribution further downstream could best be represented as coming from two sources: one at the position of the real source and another on the separation streamline. Appropriate strengths for these sources are calculated. The drop in height of the plume behind the obstacle, and the enhanced diffusion in the wake still have to be taken into account. J.M.S.

N79-27550# Atmospheric Environment Service, Downsview (Ontario).
A NUMERICAL MODEL OF FLOW ABOVE GENTLE TOPOGRAPHY WITH CHANGES IN SURFACE ROUGHNESS **c47**
P. A. Taylor *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 69-77 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

A two dimensional model of turbulent atmospheric boundary layer flow above gentle topography is extended to include spatial variations in the roughness of the underlying surface. Some sample results for flow above a Gaussian hill with and without surface roughness modulation and for flow with surface roughness modulation on flat terrain are presented. The different effects are discussed and weaknesses in the use of an eddy viscosity hypothesis are illustrated. J.M.S.

N79-27551# Systems Applications, Inc., San Rafael, Calif.
DEVELOPMENT AND VALIDATION OF A THREE-DIMENSIONAL WIND MODEL FOR AIR QUALITY ANALYSIS IN COMPLEX TERRAIN **c47**
Mei-Kao Liu, Mark A. Yocke, and James McElroy (EPA, Las Vegas, Nevada) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 79-88 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The three dimensional diagnostic wind model described is composed of several horizontal layers of variable thicknesses. For each layer, a Poisson equation was formulated with the wind convergence as the forcing function. Perturbation of the wind field due to complex terrain was included in the model by parameterizing the forcing function. Among the effects of wind perturbations treated are those due to topography, the boundary layer, urban heat islands, and mountain and valley winds. For testing and validation, the model was applied to Phoenix, Arizona; predicted wind speeds and wind directions were compared with all available measurements. Extensive statistical analysis of the results was performed to detect possible systematic biases and random errors of the model. J.M.S.

N79-27552# Western Research and Development, Calgary (Alberta).
BIVANE STUDIES OF AIR FLOW OVER IRREGULAR TERRAIN **c47**
D. M. Leahey and M. J. E. Davies *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 89-97 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Bivane data collected on the side of a plateau are presented. Uphill air flows are associated with vertical velocities greater than those needed to maintain parallel flow. The resulting rarefaction of the air is associated with markedly greater turbulence levels than those usually found over flat terrain. Downhill air flows are associated with vertical velocities less than those needed to maintain parallel flow. The resulting compression of the air is associated with much less turbulence than is the rarefaction of the air. J.M.S.

N79-27553# National Oceanic and Atmospheric Administration, Oak Ridge, Tenn. Atmospheric Turbulence and Diffusion Lab.
PARAMETERIZING ATMOSPHERIC DIFFUSION **c47**
F. A. Gifford *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 107-114 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Diffusion parameterizations for ground level sources in idealized, open terrain conditions, and fairly short travel times are reviewed. Emphasis is placed on the lateral and vertical plume standard deviations. Elevated sources, stability, and nonidealized cases are briefly discussed. J.M.S.

N79-27554# Pennsylvania State Univ., University Park. Dept. of Meteorology.
THEORETICAL BACKGROUND FOR THE CHOICE OF STABILITY PARAMETERS **c47**
Hans A. Panofsky and Robert Lipschutz *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 115-119 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

It is shown that theoretically, vertical dispersion is governed by the ratios of the height to roughness length, and height to Monin-Obukhov length. Therefore, it can be estimated from Pasquill class and roughness length. Lateral dispersion theoretically requires the knowledge of mixing depth. Recent observations show that, also, mesoscale terrain features influence lateral dispersion, but not vertical dispersion. J.M.S.

N79-27555# Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).
INFLUENCE OF THE TURBULENCE TYPING SCHEME UPON THE YEARLY AVERAGE CONCENTRATIONS BY MEANS OF A BI-GAUSSIAN MODEL **c47**
J. G. Kretzschmar and I. Mertens *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 121-132 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Bi-Gaussian models are used to make long-term as well as short-term diffusion estimates. For the same mathematical model, different turbulence typing schemes and corresponding dispersion coefficients are available. The consequences of a specific choice are demonstrated by means of practical examples, for ground-level and elevated releases. J.M.S.

N79-27556# Technischer Uerberwachungs-Verein Rheinland, e.V., Cologne (West Germany).
CRITICAL REVIEW OF DISPERSION COEFFICIENTS MEASURED AND APPLIED IN THE FEDERAL REPUBLIC OF GERMANY **c47**
Lother Kropp *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 133-143 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

A review of dispersion parameters experimentally determined and applied is given. Though the parameters evaluated show deviations, impact calculations do not differ very much. A combination of both sets of parameters is recommendable to be more reliable and more representative of a greater number of sites. These parameters should be used for effective source

heights up to about 150 meters. An application of these parameters for larger effective source heights does not seem acceptable. Impact calculations give more resonable results with respect to size and distance of the maximum concentrations from the sources. J.M.S.

N79-27557# Brookhaven National Lab., Upton, N. Y.
A COMPARATIVE STUDY OF DIFFUSION CLASSIFICATION BY LAPSE RATE, GUSTINESS AND A MODIFIED PASQUILL METHOD **c47**
Gilbert S. Raynor and Janet V. Hayes *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 145-154 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Nearly all models for calculating atmospheric diffusion include parameters to describe the horizontal and vertical diffusion rates. The amount of disagreement among three methods for estimating these parameters was determined and procedures for computing the Pasquill stability classes from surface observations were modified. Two years of hourly surface observations and tower measurements including gustiness classes were used. Lapse rates and stability classes were computed. The degree of agreement between these measures of diffusion was calculated and the conditions under which poor agreement occurred were determined. The method of computing the Pasquill classes was modified and results examined. The modified version gave better agreement between computed stability classes and the other methods and gave a more realistic distribution of unstable, neutral and stable classes. J.M.S.

N79-27558# Environmental Protection Agency, Research Triangle Park, N.C. Meteorology and Assessment Div.
USE OF WIND FLUCTUATION STATISTICS TO ESTIMATE DISPERSION NEAR ROADWAYS **c47**
William B. Petersen *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 155-164 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Wind fluctuation data from the General Motors Sulfate Dispersion Experiment were used to estimate the horizontal and vertical dispersion parameters for short downwind distances. The EPA HIWAY model was modified to use the wind fluctuation statistics to estimate ground level concentrations of sulfur hexafluoride for 61 half-hour periods. Results show that model performance was significantly improved when the fluctuation statistics were used to estimate dispersion. Author

N79-27559# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
ANALYSIS OF 1ST AND 2ND MOMENTS OF THE CONCENTRATION DISTRIBUTION FOR NEAR GROUND RELEASES OF TRACERS IN THE ATMOSPHERE **c46**
Allen H. Weber and J. C. R. Hunt (Cambridge Univ., England) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 165-172 refs (For primary document see N79-27543 18-42)
(Contract AT(07-2)-1)
Avail: NTIS HC A99/MF A01

Some results of Lagrangian-statistical theory for dispersion of near ground sources are given and plotted vs. downwind distance. The predicted dispersion coefficients seem to compare reasonably well with Brigg's rural curves. Author

N79-27560# Atmospheric Environment Service, Downsview (Ontario).
MEASUREMENTS OF DISPERSION COEFFICIENTS IN COLD ENVIRONMENT **c46**
F. H. Fanaki *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 173-185 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Intensive winter field studies at the Alberta Oil Sands area were conducted to investigate the dispersion of industrial plumes in the area. The dispersion characteristics for a stable atmosphere and light wind conditions were selected for study. The field measurements, the method adopted in determining the dispersion coefficients, and a comparison with standard values are described. J.A.M.

N79-27561# Environmental Protection Agency, Research Triangle Park, N.C.
TURBULENT STRUCTURE OF THE URBAN SURFACE BOUNDARY LAYER **c47**
J. F. Clarke, J. K. S. Ching, F. S. Binkowski, and J. M. Godowitch *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 187-196 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Surface roughness lengths and dimensionless turbulence characteristics were derived from tower measurements of the turbulent components of wind and temperature at three urban sites and a rural site in St. Louis, Missouri. Average surface roughness lengths for the three urban sites ranged from 0.7 to 1.7 m. Normalized velocity standard deviations for neutral stratification agree well with previously published values for homogeneous terrain. Turbulence intensity components are a function of surface roughness and for neutral stratification behave as predicted from similarity concepts. J.A.M.

N79-27562*# Martin Marietta Corp., Baltimore, Md. Environmental Center.
STACK PLUME CHARACTERIZATION AND MODEL ASSESSMENT WITH LIDAR DATA **c45**
Jeffrey C. Weil and Jonathan L. Altman *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 197-207 refs Sponsored by NASA (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

A mobile lidar system was used to obtain plume rise and dispersion measurements for validating plume models. Predictions of rise and spread from the two-thirds law were found to agree well with observations. These predictions were used in combination with Lamb's results for neutrally buoyant particle diffusion in the mixed layer to estimate dispersion when convective turbulence became important. Author

N79-27563# National Oceanic and Atmospheric Administration, Oak Ridge, Tenn. Atmospheric Turbulence and Diffusion Lab.
PRAIRIE GRASS REVISITED: OPTIMUM INDICATORS OF VERTICAL SPREAD **c46**
Gary A. Briggs and Kenneth R. McDonald (North Carolina State Univ., Raleigh) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 209-220 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Data from the Prairie Grass field experiment were used to test various nondimensionalizations of vertical spread from a ground source. They were also used to test the correlation of h at fixed distances with various measurable parameters. The most general results were empirical formulas. Other, simpler nondimensionalizations were found to order the data well, but were harder to apply to other types of sites. Scaling with mixing layer parameters did not work quite as well, but its relative performance improves with distance. J.A.M.

N79-27564# Kernforschungsanlage, Juelich (West Germany). Central Div. for Radiation Protection.
NEW SETS OF DIFFUSION PARAMETERS RESULTING FROM TRACER EXPERIMENTS IN 50 AND 100 METRES RELEASE HEIGHT **c46**
K. J. Vogt, H. Geib, and G. Polster *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 221-239 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Comprehensive diffusion test series with tracered plumes released at 50 and 100 meters height above ground were conducted in order to measure the diffusion parameters required for environmental impact calculations using the Gaussian diffusion

equation. The resulting data sets cover all diffusion categories and source distances up to 11 kilometers. The environment represents medium to major surface roughness. The ground level diffusion factors for short-time and long-time releases calculated with these diffusion parameters were compared with the curves based on other prominent sets of diffusion parameters. J.A.M.

N79-27565# Ente Nazional per l'Energia Elettrica, Milan (Italy).
RESULTS OF SF6 TRACER DIFFUSION EXPERIMENTS NEXT TO A POWER PLANT c45
P. Bacci, A. Longhetto, F. Bossa (TGT, Milan), P. Gaglione (Joint Research Centre of the European Communities), and G. Bonino (CNR, Turin) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 241-249 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

On the basis of the experimental data, obtained during two weekly field experiments of diffusion of SF6 tracer in low wind speed conditions, the behavior of lateral dispersion coefficients were considered. A relationship was obtained between these coefficients and wind speed. Vertical distribution of wind speed and direction with pilot balloons tracked by aerological theodolites and vertical temperature profiles with a fast-response thermosonde assembled on single-engine aircraft were also measured in order to get the general data for the diffusion experiments. J.A.M.

N79-27566# Norwegian Inst. for Air Research, Lillestrom.
DISPERSION PARAMETERS DETERMINED FROM MEASUREMENTS OF WIND FLUCTUATIONS (SIGMA SUB THETA), TEMPERATURE AND WIND PROFILES c47
Bjarne Sivertsen *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 251-261 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The applicability of using wind, turbulence, and temperature data from the NILU automatic weather station to estimate dispersion parameters was investigated. The standard deviations of the horizontal wind direction fluctuations were used. Vertical eddy diffusivities calculated from similarity theory using wind and temperature profiles, were also used. J.A.M.

N79-27567# Ontario Ministry of the Environment, Toronto.
SHORT-TERM DISPERSION FROM TALL STACKS c45
A. Venkatram and J. Kurtz *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 271-280 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The micrometeorological variables associated with looping of plumes from elevated stacks were studied. The convective velocity scale omega and the mean wind mu are used to derive a useful criterion for the onset of looping. It is shown that omega is proportional to the half power of the surface heat flux, which suggests that the occurrence of high concentrations can be related to incoming solar radiation. Data from the 381 m stack at Sudbury shows that it is very difficult to estimate hourly averaged concentrations during unstable conditions. This poses problems for tall stack design which is based on the notion of maximum possible concentration. A stack design technique based on an exponential pollutant frequency distribution is discussed as a possible solution. S.E.S.

N79-27568# Systems Applications, Inc., San Rafael, Calif.
AN IMPROVED VERSION OF THE REACTIVE PLUME MODEL (RPM-II) c45
Mei-Kao Liu, Douglas A. Stewart, and Philip M. Roth *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 281-290 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

A reactive plume model was revised to consider concentration distributions across the plume. The model is composed of a fixed number of cells that can expand as the plume travels downwind. For an inert pollutant, there is no net flux across the cell boundaries. Reactive pollutants, net fluxes are calculated via equivalent diffusion coefficients. The Carbon-Bond Mechanism was incorporated into the revised model to treat the reactions of hydrocarbons and oxides of nitrogen. S.E.S.

N79-27569# Atmospheric Environment Service, Downsview (Ontario).
EXPERIMENTS WITH A MARKOV CHAIN DISPERSION MODEL APPLIED TO VERTICAL DISPERSION IN THE SURFACE LAYER c45
John D. Reid *In* NATO Comm. on the Challenges of Mod. Soc. Pro. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 291-300 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The basis of the model and parameterizations of mean and turbulent wind components are presented. Model results for a near surface source in neutral stratification show good agreement with Porton data. Elevated source simulations indicate that the mass mean pollutant height (zeta hyperon) variation is normalized using a nondimensionalized downwind coordinate incorporating advective wind speed and wind shear, while the distribution equivalent Gaussian spread (Sigma sub zeta) shows a fair degree of independence of source height. Simulations for nonneutral cases show trends with stability variation in agreement with observation but suffer from lack of an adequate empirical observational base. S.E.S.

N79-27570# California Univ., Livermore. Lawrence Livermore Lab.
OBJECTIVE WIND FIELD PATTERN CHARACTERIZATION c47
John J. Walton and Christine A. Sherman *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 301-312 refs (For primary document see N79-27543 18-42)
(Contract W-7405-eng-48)
Avail: NTIS HC A99/MF A01

The method of principal components analysis provided a basis for comparison of wind field patterns at different times and for generating typical patterns when similarities are identified. The method was used to produce wind fields to drive a transport diffusion code. S.E.S.

N79-27571# California Univ., Livermore. Lawrence Livermore Lab.
MASS-CONSISTENT WIND FIELD MODELING: FINITE DIFFERENCE VIS-A-VIS FINITE ELEMENT c47
Dieter R. Tuerpe, Daniel J. Rodriguez, Philip M. Gresho, and Robert L. Sani *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 313-322 refs (For primary document see N79-27543 18-42)
(Contract W-7405-eng-48)
Avail: NTIS HC A99/MF A01

The differences which arise from solving a regional wind model by finite difference and finite element approximations were compared. The wind field model under consideration is a least squares adjustment model which is constrained to have zero divergence in three dimensions. Preliminary results obtained from an actual data set for the island of Oahu show no major differences between the results from the two methods, even though the topography was modeled quite differently. S.E.S.

N79-27572# Risoe National Lab., Roskilde (Denmark).
REPRESENTATION OF INTER GRID SOURCES IN PSEUDO-SPECTRAL DISPERSION MODELS c45
Ruwim Berkowicz (Danish Meteorological Inst., Copenhagen) and Lars P. Prahm *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 323-332 refs Submitted for publication (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Mixing of pollutants in the atmosphere and in fluids is treated by pseudospectral dispersion model. Methods for numerical representation of information between the grid points in this grid point dispersion model were demonstrated. A procedure for construction of both point and area sources, not restricted to

grid points only, is developed. Application of these qualities of the model for atmospheric dispersion of pollutants from stationary and moving sources e.g. at an airport is discussed. The simulation is based on computation of source fields by means of Fourier expansions continuous in real space. Grid point values were calculated by truncated Fourier series with a finite number of wave vectors. S.E.S.

N79-27573# Form and Substance, Inc., Westlake Village, Calif.
VERIFICATION OF THE MADCAP MODEL OF PHOTOCHEMICAL AIR POLLUTION IN THE SAN DIEGO AIR BASIN **c45**
Ralph C. Sklarew *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 333-342 (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Model of Advection, Diffusion, and Chemistry of Air Pollution (MADCAP) was developed and optimized for regional photochemical air pollution simulation. MADCAP was used for assessing the future air quality impact of the North Los Angeles County General Plan. MADCAP was extensively tested and applied in the San Diego air basin. The results of these tests show success in simulating the magnitude, position and decay of the ozone peak, the midday CO and NOx minima, the NO2 peak and the NOx decay. MADCAP is used for evaluating land use growth scenarios in San Diego. S.E.S.

N79-27574# Form and Substance, Inc., Westlake Village, Calif.
POINT SOURCE AIR POLLUTION MODELING **c45**
Ralph C. Sklarew *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 343-352 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Point source air pollution models are increasingly called upon to provide quantitative predictions for major decisions of plant siting, control requirements and fuel utilization. A general Gaussian model (GEM), and a modular grid model (IMPACT) are used to provide the requisite modeling capability. A few of the features along with a detailed application for each model are described. Results indicate that both models continue to evolve as new applications highlight potential improvements. S.E.S.

N79-27575# Environmental Research and Technology, Inc., Santa Barbara, Calif.
REGIONAL TRANSPORT AND PHOTOCHEMICAL MODEL OF ATMOSPHERIC SULFATES
Thomas F. Lavery, James W. Thrasher, Daniel A. Godden, Alan C. Lloyd, and George M. Hidy *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 353-362 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The formulations and assumptions of the regional model are presented. The model simulates processes in the atmospheric boundary layer to a height of about 1500 m with a variable vertical grid resolution and a horizontal grid resolution of 80 km. The model formulation includes descriptors for the important atmospheric transport and chemical mechanisms including advection by the mean wind, vertical turbulent diffusion, transformation processes, and deposition at the ground surface. It simulates temporally and spatially varying emissions and allows for the specification of boundary values and initial pollutant concentrations. The model inputs and results are discussed. Predicted sulfur dioxide and sulfate concentrations are compared with observed ground-level values. M.M.M.

N79-27576# SRI International Corp., Menlo Park, Calif.
THE EUROPEAN REGIONAL MODEL OF AIR POLLUTION (EURMAP) AND ITS APPLICATION TO SHORT TERM EPISODES **c45**
W. B. Johnson, C. M. Bhumralkar, R. L. Mancuso, and D. E. Wolf *In* NATO Comm. on the Challgenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 363-385 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The distributions of SO2 and sulfate air concentrations and their surface depositions across Europe were studied. A model was evaluated by varying different parameters until results were obtained that gave best fit to the meausred SO2 and sulfate air concentrations. The results are obtained by: (1) the use of higher transport wind speed and mixing height; (2) the inclusion of seasonal variations of emissions and mixing height; and (3) the use of slightly higher decay sites. A short term version of the model (EURMAP-2) was developed by incorporating modifications based on the results of evaluation of EURMAP-1. The sulfur concentrations computed by the EURMAP-2 model are qualitatively in good agreement with the measured values over Europe. M.M.M.

N79-27577# Teknekron, Inc., Berkeley, Calif. Meteorology Group.
A CLIMATOLOGY OF METEOROLOGICAL PARAMETERS FOR SHORT-RANGE DISPERSION AND LONG-RANGE TRANSPORT **c47**
Brand L. Niemann and Peter M. Mayerhofer *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 387-396 refs (For primary document see N79-27543 18-42)
(Contract EPA-68-01-1921)
Avail: NTIS HC A99/MF A01

Surface and upper air weather data at locations throughout the United States and eastern Canada were processed and analyzed to provide meteorological parameters for use in multi-scale models for predicting the air quality impact of fossil steam plants. The results were integrated to provide the critical parameters and frequencies for each of six conditions of interest for the short range dispersion of stack plumes, namely, coning, fumigation, trapping below an elevated inversion, extreme looping, surface layer decoupling, embedding in an inversion aloft. The results were structured to provide the parameters and frequencies for each of the five conditions of importance to long range transport of stack plumes. M.M.M.

N79-27578# Teknekron, Inc., Berkeley, Calif.
A MULTI-SCALE DISPERSION MODEL FOR LOCAL AND REGIONAL SULFUR DIOXIDE/SULFATE CONCENTRATIONS: FORMULATION AND INITIAL EVALUATION **c45**
Michael T. Mills and Allan A. Hirata *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 397-406 refs (For primary document see N79-27543 18-42)
(Contract EPA-68-01-1921)
Avail: NTIS HC A99/MF A01

A technique well suited to the analysis of the emission control strategies under consideration by the U.S. Environmental Protection Agency for fossil steam plants is presented. The results of an initial sensitivity analysis are given and plans for model evaluation including the coupling of the local and regional scale models, are discussed. M.M.M.

N79-27579# Teknekron, Inc., Waltham, Mass.
COMPILATION AND ANALYSIS OF DATA SETS FOR THE EVALUATION OF REGIONAL SULFATE MODELS **c45**
Eugene Y. Tong and Robert B. Batchelder *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 407-416 refs Prepared in cooperation with Boston Univ., Mass. (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Air quality and aerometric measurements were compiled to: (1) enable a delineation of those macroscale features in regional sulfate distribution which are important parameters considered in the development of predictive methods; (2) enable those researchers involved in model development work to evaluate their modeling procedures on common data sets so that the relative merits of various modeling methods may be delineated; and (3) provide an integrated data base as aerometric input to other research efforts which need immediate information as one of their planning tools. M.M.M.

N79-27580# Toronto Univ. (Ontario). Inst. for Environmental Studies.
THE DESIGN OF AIR QUALITY NETWORKS **c45**

R. E. Munn *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 417-427 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The general approaches to network design are of three main types: statistical, modelling, and combined modelling-statistical. In each case, the monitoring objectives and the permissible confidence limits must be specified. A critical review of the literature is presented, and some suggestions for research are given. Author

N79-27581# Waterloo Univ. (Ontario).
A PLUME DISPERSION STUDY AT MILDRED LAKE, ALBERTA **c45**
G. A. Davidson, P. R. Slawson, and S. G. Djurfors *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 441-454 refs Prepared in cooperation with Syncrude Canada Ltd., Edmonton (Alberta) (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Measurements of the rise and dispersion of the plume from the Great Canadian Oil Sands plant near Mildred Lake, Alberta were conducted during four seasonal periods in 1977. The behavior of the plume near the source was recorded photographically, while further downwind, sulphur dioxide levels were recorded using an aircraft. Vertical profiles of wind and temperature were measured by pibal and minisonde releases. Details of the experimental program are presented, along with some preliminary results. The ability of three existing models to predict plume rise and growth during periods of wind speed shear is examined in using data collected in the study. Author

N79-27582# Environmental Protection Agency, Chicago, Ill.
THE RATIO OF PEAK 1-HOUR AVERAGE CONCENTRATIONS TO PEAK CONCENTRATIONS OF OTHER AVERAGING TIMES FOR VARIOUS POLLUTANTS AND DIFFERING SOURCES **c45**
Dennis A. Trout *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 455-464 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Maximum observed 1 hour averaged concentrations were compared to the maximum observed concentrations for averaging times ranging from 5 minutes to 1 year. Pollutants considered include CO, HC, NO, NO2, NOx, O3, and SO2. The types of sources include rural power plants and numerous urban complexes. The ratio Xmax(1-hour)/Xmax(t) is represented by the function at to the b power, where t is averaging time in hours. The exponent, b, varies between 0.1 and 0.7 depending primarily on averaging time and source type. Strong similarity is shown for pollutants from similar source types. M.M.M.

N79-27583# Du Pont de Nemours (E. I.) and Co., Wilmington, Del.
VALIDATION OF CRSTER MODEL AIR QUALITY ESTIMATES FOR AN INDUSTRIAL PLANT **c45**
Robert I. Wevodau, Jr. *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 465-474 (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Estimates obtained using the CRSTER model are compared to measured air quality from two continuous SO2 monitors near a Seaford, Delaware, plant. This isolated plant is an excellent location for a validation study because of low background and flat terrain. Based on three years' data, model predictions of maximum concentrations are generally within 30% of observed values, with some tendency toward underprediction. Underprediction can be effectively eliminated, without introducing unreasonable overprediction, by assigning class C (slightly unstable) sigma values to all class D (neutral) stability occurrences. A.R.H.

N79-27584# Environment Canada, Halifax (Nova Scotia).
TESTS OF THE CLIMATOLOGICAL DISPERSION MODEL AND GAUSSIAN MODELS AT THE STRAIT OF CANSO AND AT LINGAN, NOVA SCOTIA **c47**
R. W. Shaw, E. W. Brandon, and K. G. Hamilton *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 475-484 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

An attempt was made to account for the main channelling effects of the topography of an industrial area of the Strait of Canso in the input data for the climatological dispersion model. Predicted annual and monthly concentrations of sulphur dioxide showed a good agreement except for the summer months. A simple Gaussian model was tested at Lingan, Nova Scotia, using concurrent soundings of wind and temperature. A logarithmic adjustment to predicted centerline values brought 60% of them to within a factor of 3 of the observations. Further testing of the method is indicated. A.R.H.

N79-27585# Universite Catholique de Louvain (Belgium). Inst. d'Astronomie et de Geophysique.
SENSITIVITY OF A GAUSSIAN PLUME MODEL TO THE VERTICAL DISPERSION PARAMETERS **c46**
A. L. Berger and Chr. Legros *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 485-497 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The data base of Frankfurt-am-Main was used, but only the most important point and area sources were considered in an investigation of the sensitivity of the LPADM model to changes in vertical dispersion (sigma sub z) parameters. The sigma sub z by Pasquill-Gifford-Singer-Smith was multiplied by several constants and replaced by other formulas (Briggs, Klug, Martin-Tikvart). The initial dispersion for area sources, sigma sub zo was changed and negative values were tested. Results obtained and comparison with those obtained by Sivertsen show that the Qaussian plume models are very sensitive to the vertical dispersion parameters. A.R.H.

N79-27586# British Leyland Motor Corp., Allesley (England).
THE APPLICATION OF A MATHEMATICAL MODEL TO THE ESTIMATION OF THE CONCENTRATIONS OF POLLUTANTS IN EUROPEAN CITIES **c45**
John H. Weaving, Stephen F. Benjamin, Paolo P. Gaddo, and Francesco Repetto *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 499-510 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

A grid-type model which represents the transport and chemical reactions of pollutants over a city was provided by the E.P.A. and applied to the city of Turin, Italy, where secondary photochemical pollutants are likely to be higher than over other European cities. The inputs to the model are numerical representations of the meteorological and emission conditions; the inflow boundary conditions also have to be supplied. The collection and treatment of input data are described. Preliminary results from an application of the model to Turin indicate that more determinations must be made before the pollution pattern for that city can be predicted with confidence. A.R.H.

N79-27587# FEEMAS (Italy).
MATHEMATICAL MICROMODEL FOR LOCAL DIFFUSION OF CARBON MONOXIDE FROM MOTOR VEHICLES **c45**
P. P. Gaddo, F. Corazzari, L. Giacomelli, A. Moscatelli, M. Fontana, and D. Ferrante *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 511-520 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The distribution of vehicular emissions inside canyon streets was evaluated in urban areas of Turin. The input data of the model were traffic flows inside 80 sample streets and specific emission from traffic, experimentally measured; and micrometeorological parameters. A model calibration was made before of the extention to all sample streets. The model, which permitted calculation of the carbon monoxide concentration levels at various

heights and at ground level, depending on traffic volumes and meteo conditions, provides good results. A.R.H.

N79-27588# Beak Consultants Ltd., Toronto (Ontario).
STABILITY SENSITIVITY OF THE CLIMATOLOGICAL DISPERSION MODEL: A PRACTICAL EXAMINATION **c45**

James W. S. Young *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 521-525 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The climatological dispersion model was used to predict the annual concentration of particulate matter from both area and point sources around an iron ore processing facility in Northern Ontario. The role of the distribution of stability categories, as determined by the DAY-NIGHT STAR analysis, is examined to evaluate its effect on the correlation between calculated and observed concentrations. The major conclusion is that, for practical applications, stability appears not to be an important factor in the assessment of long-term ground-level concentrations. A.R.H.

N79-27589# Systems Applications, Inc., San Rafael, Calif.
A CONSIDERATION OF MEASURES AND STANDARDS OF PERFORMANCE OF AIR QUALITY SIMULATION MODELS **c45**

S. R. Hayes *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 527-537 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

A procedure for evaluating model performance, testing for the presence of certain key attributes of a desirable model is presented. Acceptability of model behavior is determined by calculating several performance measures and comparing their values with specific standards. Failure to demonstrate a key attribute may or may not cause a model to be rejected, depending on both the type of model application and the pollutant. The use of the procedure is demonstrated by evaluating the performance of a photochemical grid model. A.R.H.

N79-27590# ETA Engineering, Inc., Westmont, Ill.
AIR MONITORING NETWORK DESIGN FOR POWER PLANT SITING **c45**

Roger K. Raufer, Jay E. Norco, Terry D. Worrell, Richard A. Braun, Joseph E. Marks, and Kenneth E. Noll *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 547-556 refs Prepared in cooperation with Commonwealth Edison Co., Chicago and Illinois Inst. of Tech., Chicago (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Recent United States legislation concerning Prevention of Significant Deterioriation can require ambient monitoring for proposed large point sources, in both pre-construction and post-construction phases. The design of a monitoring network applicable to both phases is described, using two disparate modeling approaches: an objective technique which allows a quantitative evaluation of each proposed monitor, and multiple source dispersion modeling. The application of the methodology to a proposed power plant in Northern Illinois is described.
Author

N79-27591# Pennsylvania State Univ., University Park. Dept. of Meteorology.
NUMERICAL SIMULATIONS OF COASTAL-ZONE BOUNDARY LAYER VENTILATION AND POLLUTION TRANSPORT **c47**

Thomas T. Warner, Richard A. Anthes, and Alan L. McNab *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 557-568 refs Sponsored in part by Navy and NSF (For primary document see N79-27543 18-42)
(Grants DAAG29-76-G-0157; EPA-R-800397)
Avail: NTIS HC A99/MF A01

A two dimensional, primitive equation model with a high resolution planetary boundary layer formulation was used to study the relationship between the circulation induced by the differential thermal forcing at a coast and the depth of the well mixed layer over the land. Parcel trajectories calculated from data generated by a model simulation were used to indicate the nature of the pollution transport produced by the onshore and offshore branches of the circulation. Results from three-dimensional experiments are then presented illustrating the development of sea and bay breeze circulations in a coastal region characterized by complicated land-sea boundaries. R.E.S.

N79-27592# Dames and Moore, Atlanta, Ga.
RECEPTOR GRID SELECTION IN MODEL EVALUATION STUDIES TO COMPENSATE FOR UNCERTAINTY IN WIND DIRECTION SPECIFICATION **c47**

Paul D. Gutfreund *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 569-582 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

An objective technique for compensating for uncertainty in the specification of wind direction in model evaluation studies is presented. This technique involving a hypothetical receptor ring of radius 0.25 km centered upon each actual monitor location was used in the comparative evaluation of several different modeling options applied to case studies of 24 hour and 3 hour periods of interest in three urbanized areas in Florida. The evaluation results indicate that in Florida the best modeling option was one incorporating rural dispersion coefficients and an explicit treatment of aerodynamic downwash. The application of this receptor ring to the subsequent evaluation of alternative proposed emissions standards in each area was discussed. R.E.S.

N79-27593# Wien Univ. (Austria).
METEOROLOGICAL INPUT DATA FOR THE VIENNA DISPERSION MODEL **c47**

Helga Kolb *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 583-602 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Different sets of meteorological input data were investigated in order to find one representative set of meteorological input data for a Gaussian dispersion model of Vienna. A procedure for the definition and the determination of mixing height classes is suggested. Author

N79-27594# Hokkaido Univ., Sapporo (Japan).
ON A CALENDAR-TIME ORIENTED SYSTEMATIC SAMPLING PLAN IN AIR QUALITY MONITORING **c45**

Rikita Inouye *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 603-609 ref (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

The relationship between the sampling interval and the estimated accuracy of statistical values of the population obtained from sampled statistical values in the case of sampling made of air pollution concentrations at an equal time interval was investigated. Values of the variance of sample means and the variance of sample variances were obtained by simple random sampling excluding limited corrections. R.E.S.

N79-27595# Laboratorio Provinciale Igiene e Profilassi, Milan (Italy).
VALIDATION OF THE SO2 EMISSION INVENTORY FOR THE MILAN DISTRICT AREA (50 X 50 km) **c45**

R. Gualdi, G. Tebaldi, and P. Lega (Osservatorio Meteorol. di Brera, Milan, Italy) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 611-620 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

A detailed SO2 emission inventory was checked against different local conditions. Spatial distributions and temporal trends were carried out through indirect methods. The SO2 amount emitted by an area source was calculated as a function of built volumetry, population density, and temperature. R.E.S.

N79-27596# Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Environmental Planning.
VERTICAL CHANGES IN STABILITY CONDITIONS WITHIN THE FIRST 100 METERS: TENNESSEE VALLEY **c47**
George W. Reynolds *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 625-636 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

Hourly temperature lapse rates in the three layers defined by three levels of temperature measurement were examined. Stability categories were assigned in accordance with standard practices. The results showed frequent substantial differences in the simultaneous stability conditions of the three layers. These results suggest the likelihood of considerable improvement in the prediction of ambient air pollution concentrations by a model which allows for lapse rate changes in the layer from effective plume height to the ground. Author

N79-27597*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PROCEEDINGS OF THE CONFERENCE ON COAL USE FOR CALIFORNIA
15 Aug. 1978 539 p refs Conf. held at Pasadena, Calif., 9-11 May 1978 Sponsored in part by DOE and the California Energy Commission
(Contract NAS7-100)
(NASA-CR-158770; JPL-Pub-78-56) Avail: NTIS HC A23/MF A01 CSCL 10B

The papers, statements, and panel session transcriptions that resulted from the conference are presented. The conference brought together approximately 400 specialists, students, interest groups and general public for the examination of technological, institutional, and social issues surrounding coal use for California and the identification of attendant constraints, impediments, advantages, and target opportunities. The expertise of the participants cover a wide range of subject matter that includes systems examination of coal opportunities, energy demand forecasting, environmental aspects of coal use, coal supply and transport, viewpoint of neighboring states, air pollution control, direct firing, coal gasification and liquefaction technologies, economics of coal use, and the regulatory system. For individual titles, see N79-27598 through N79-27619.

N79-27598*# Southern California Edison Co., Rosemead.
USING COAL INSIDE CALIFORNIA FOR ELECTRIC POWER **c44**
Jack B. Moore *In* JPL Proc. of Conf. on Coal Use for California 15 Aug. 1978 p 13-19 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

In a detailed analysis performed at Southern California Edison on a wide variety of technologies, the direct combustion of coal and medium BTU gas from coal were ranked just below nuclear power for future nonpetroleum based electric power generation. As a result, engineering studies were performed for demonstration projects for the direct combustion of coal and medium BTU gas from coal. Graphs are presented for power demand, and power cost. Direct coal combustion and coal gasification processes are presented. G.Y.

N79-27599*# Battelle Columbus Labs., Ohio.
USING COAL INSIDE CALIFORNIA FOR NONELECTRIC APPLICATIONS **c44**
Joseph H. Oxley *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 20-32 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

A review of present energy consumption patterns in the manufacturing, transportation, and residential sectors is presented. The properties of coal that affect its substitution into these market sectors are discussed. Specific needs and concerns of Californians are delineated. Present nonelectric consumptive uses of coal in California are outlined. Current world-wide progress concerning increased industrial use of coal is shown. An overview is given of the options to protect the environment from the direct use of coal, especially from the standpoint of sulfur control; and a time frame for commercialization is projected. Possible desired changes in energy use patterns over the next fifty years are proposed. G.Y.

N79-27600*# Fluor Engineers and Constructors, Inc., Irvine, Calif.
A SYSTEMS EXAMINATION OF THE OPPORTUNITIES OF COAL FOR CALIFORNIA **c44**
W. M. Hathaway *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 33-36 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

Because of decreasing availability of petroleum fuels and natural gas, it is imperative that alternative means be developed for meeting demands. The options available for importing energy derived from coal are examined. These include: (1) electric power generated from coal; (2) coal gasification near the mine site for conversion to substitute natural gas or liquid products such as methanol or hydrocarbons; and (3) converting the coal directly to liquid hydrocarbons similar to a synthetic crude oil. Comment is made on the long lead times required between conception and completion of facilities of this type. Because of political and economic impediments, excessive delays have resulted in cancellation of projects. The need for statesmen and citizens with vision and courage to act is summarized. G.Y.

N79-27601*# California Energy Commission, Sacramento. Electricity Planning Program.
ELECTRIC ENERGY DEMAND AND SUPPLY PROSPECTS FOR CALIFORNIA **c44**
H. G. Mike Jones *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 49-52 ref (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

A recent history of electricity forecasting in California is given. Dealing with forecasts and regulatory uncertainty is discussed. Graphs are presented for: (1) Los Angeles Department of Water and Power and Pacific Gas and Electric present and projected reserve margins; (2) California electricity peak demand forecast; and (3) California electricity production. G.Y.

N79-27602*# Pacific Gas and Electric Co., San Francisco, Calif.
COAL'S ROLE IN CALIFORNIA'S ENERGY NEEDS **c44**
Nolan H. Daines *In* JPL Proc. of the Conf. on Coal Use for California refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

California's post-industrial society demands confidence in the energy supply system as an essential ingredient for social harmony and adequate job creating capital investment. Confidence requires policies which balance supply and demand using believable methods with adequate allowance for the unexpected, reliance on diverse sources and locations, respect for our environment, sustain our individual freedoms and provide opportunities for economic mobility. Coal will play only a part, but an important part, in a multifaceted energy policy using numerous energy sources and systems, conservation techniques, and cooperating societal institutions. Today's extensive and challenging research and development provides the foundation for future technologies which will further resolve the environmental effects associated with coal. Author

N79-27603*# Atlantic Richfield Co., Harvey, Ill.
ENERGY SUPPLY AND DEMAND IN CALIFORNIA **c55**
Edward D. Griffith *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 56-60 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

The author expresses his views on future energy demand on the west coast of the United States and how that energy demand translates into demand for major fuels. He identifies the major uncertainties in determining what future demands may be. The major supply options that are available to meet projected demands and the policy implications that flow from these options are discussed. G.Y.

N79-27604*# Sierra Club, Washington, D.C. Southern California Energy Committee Chair.
POSSIBLE ENVIRONMENTAL EFFECTS OF INCREASED COAL USE IN CALIFORNIA **c45**

Dwight L. Carey *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 73-75 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13B

If coal is to be utilized in California it must be made compatible with the state's drive toward restoring environmental quality. The impacts resulting from coal's mining and transportation, or from water consumption, water quality degradation and electric transmission line routing can probably be adequately mitigated through strong and early planning efforts, the use of improved control and process technologies, and sincere utility commitment. The socioeconomic impacts may prove somewhat more difficult to satisfactorily mitigate. Of greatest concern is adequate control of generated air pollutants and disposal of solid and liquid wastes since acceptable technologies or handling techniques have yet to be conclusively demonstrated. Author

N79-27605*# California Space Shuttle Task Force.
AIR QUALITY AS A CONSTRAINT TO THE USE OF COAL IN CALIFORNIA **c45**
Thomas C. Austin *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 76-86 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13B

Low-NOx burners, wet scrubbing systems, baghouses and ammonia injection systems are feasible for use on large combustion sources such as utility boilers. These devices, used in combination with coal handling techniques which minimize fugitive dust and coal transportation related emissions, should enable new power plants and large industrial boilers to burn coal without the adverse air quality impacts for which coal became notorious. G.Y.

N79-27606*# California State Dept. of Water Resources, Sacramento.
WATER AS A CONSTRAINT TO THE USE OF COAL FOR CALIFORNIA **c44**
Ronald B. Robie *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 87-89 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

The contraints for using water to cool coal-fired power plants are discussed. G.Y.

N79-27607*# Bituminous Coal Research, Inc., Monroeville, Pa.
COAL SUPPLY FOR CALIFORNIA **c43**
Joseph J. Yancik *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 111-120 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 08G

The potential sources and qualities of coals available for major utility and industrial consumers in California are examined and analyzed with respect to those factors that would affect the reliability of supplies. Other considerations, such as the requirements and assurances needed by the coal producers to enter into long-term contracts and dedicate large reserves of coal to these contracts are also discussed. Present and potential future mining contraints on coal mine operators are identified and analyzed with respect to their effect on availability of supply. Author

N79-27608*# Energy Transportation Systems, Inc., San Francisco, Calif.
PROSPECTS FOR COAL SLURRY PIPELINES IN CALIFORNIA **c31**
John F. Lynch *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 123-126 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13I

The coal slurry pipeline segment of the transport industry is emerging in the United States. If accepted it will play a vital role in meeting America's urgent energy requirements without public subsidy, tax relief, or federal grants. It is proven technology, ideally suited for transport of an abundant energy resource over thousands of miles to energy short industrial centers and at more than competitive costs. Briefly discussed are the following: (1) history of pipelines; (2) California market potential; (3) slurry technology; (4) environmental benefits; (5) market competition; and (6) a proposed pipeline. G.Y.

N79-27609*# Electric Power Research Inst., Palo Alto, Calif.
STATUS OF NO SUB X CONTROL FOR COAL-FIRED POWER PLANTS **c45**
D. P. Teixeira *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 171-180 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13B

The status of technologies for controlling emissions of oxides of nitrogen (NOx) from coal-fired power plants is reviewed. A discussion of current technology as well as future NOx control approaches is presented. Advanced combustion approaches are included as well as post-combustion alternatives such as catalytic and noncatalytic ammonia-bases systems and wet scrubbing. Special emphasis is given to unresolved development issues as they relate to practical applications on coal-fired power plants. J.M.S.

N79-27610*# Teknekron, Inc., Berkeley, Calif.
ECONOMIC COMPARISON OF FABRIC FILTERS AND ELECTROSTATIC PRECIPITATORS FOR PARTICULATE CONTROL ON COAL-FIRED UTILITY BOILERS **c45**
Peter M. Cukor and Richard A. Chapman *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 183-194 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13B

The uncertainties and associated costs involved in selecting and designing a particulate control device to meet California's air emission regulations are considered. The basic operating principles of electrostatic precipitators and fabric filters are discussed, and design parameters are identified. The size and resulting cost of the control device as a function of design parameters is illustrated by a case study for an 800 MW coal-fired fired utility boiler burning a typical southwestern subbituminous coal. The cost of selecting an undersized particulate control device is compared with the cost of selecting an oversized device. J.M.S.

N79-27611*# Ultrasystems, Inc., Irvine, Calif.
ECONOMIC CONSIDERATIONS IN COVERTING FROM OIL/GAS FIRING TO COAL **c44**
John G. Rau *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 211-216 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

Economic considerations involved in fuel conversion such as from oil and/or gas firing to coal are discussed including investments costs for new facilities and equipment (including air pollution control equipment), operation and maintenance costs, and purchased fuel costs. An analytical approach to assessing the cost effectiveness of fuel conversion in terms of the annual net cost of conversion, the equivalent annual number of barrels of oil saved, and the integral rate of return of the conversion investment is presented. Illustrative numerical examples are presented for typical utility boilers and industrial boiler facilities. A further consideration addressed deals with the impacts of these costs on the overall financial structure of the firm and the ability of the firm to raise the necessary investment captial. J.M.S.

N79-27612*# Southern California Edison Co., Rosemead.
DIRECT FIRING OF COAL FOR POWER PRODUCTION **c44**
L. T. Papay *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 217-224 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

The use of new technology and advanced emission control hardware to reduce emissions from the direct combustion of coal to produce electricity in California is considered. The technical feasibilty of a demonstration project on an existing 81-MW boiler is demonstrated. J.M.S.

N79-27613*# Pope, Evans, and Robbins, Inc., New York.
FLUIDIZED COMBUSTION OF COAL **c44**
Michael Pope *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 225-227 refs (For primary document

see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10A

A combustion technology that permits the burning of low quality coal, and other fuels, while maintaining stack emissions within State and Federal EPA limits is discussed. Low quality fuels can be burned directly in fluidized beds while taking advantage of low furnace temperatures and chemical activity within the bed to limit SO2 and NOx emissions. The excellent heat transfer characteristics of the fluidized beds also result in a reduction of total heat transfer surface requirements. Tests on beds operating at pressures of one to ten atmospheres, at temperatures as high as 1600 F, and with gas velocities in the vicinity of four to twelve feet per second, have proven the concept. The progress that has been made in the development of fluidized bed combustion technology and work currently underway are discussed. J.M.S.

N79-27614*# Texaco, Inc., Montebello, Calif.
THE TEXACO COAL GASIFICATION PROCESS FOR MANUFACTURE OF MEDIUM BTU GAS **c44**
W. G. Schlinger *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 243-247 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10A

The development of the Texaco coal gasification process is discussed with particular emphasis on its close relationship to the fully commercialized Texaco synthesis gas generation process for residual oil gasification. The end uses of the product gas are covered, with special attention to electric power generation via combined cycle technology. Control of SO2, NOx, and particulate emissions in the power generating mode is also covered. The application of this technology in a proposed Texaco-Southern California Edison demonstration project is mentioned. Investment information released for a 1000-megawatt advanced combined cycle gasification facility, is also reviewed. J.M.S.

N79-27615*# Southern California Gas Co., Los Angeles.
SYNTHETIC NATURAL GAS IN CALIFORNIA: WHEN AND WHY **c28**
W. B. Wood *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 249-252 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

A coal gasification plant planned for northwestern New Mexico to produce 250 MMCFD of pipeline quality gas (SNG) using the German Lurgi process is discussed. The SNG will be commingled with natural gas in existing pipelines for delivery to southern California and the Midwest. Cost of the plant is figured at more than $1.4 billion in January 1978 dollars with a current inflation rate of $255,000 for each day of delay. Plant start-up is now scheduled for 1984. J.M.S.

N79-27616*# Gulf Mineral Resources Co., Denver, Colo.
STATUS REPORT THE SRC-1 AND SRC-2 PROCESSES **c28**
George E. Chenoweth *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 258-261 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

Bench-scale and pilot plant development of solvent refined coal (SRC) processes is reviewed. Large SRC demonstration plants are described. Commercialization of the process is envisioned for the 1980's. J.M.S.

N79-27617*# Ashland Oil and Refining Co., Ky.
THE H-COAL PROCESSES: A STATUS REPORT **c28**
William C. Voss *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 262-267 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

A catalytic process (H-Coal) involving the direct hydrogenation of coal to produce hydrocarbon liquids is described. Bench-scale and pilot plant development of the H-Coal process is reported. Emphasis is placed on a proposed pilot plant which will be the largest coal liquefaction plant on-line in the U.S., processing up to 600 tpd of coal. Economic considerations are given. J.M.S.

N79-27618*# Exxon Research and Engineering Co., Florham Park, N. J.
EXXON DONOR SOLVENT COAL LIQUEFACTION PROCESS **c28**
W. R. Epperly, L. E. Swabb, Jr., and J. W. Tauton *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 268-272 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

A solvent coal liquefaction process to produce low-sulfur liquid products from a wide range of coals is described. An integrated program of laboratory and engineering research and development in conjunction with operation of a 250 T/D pilot plant is discussed. J.M.S.

N79-27619*# Vulcan-Cincinnati, Inc., Ohio.
METHANOL FROM COAL **c28**
Donald R. Miller *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 273-277 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 21D

Economic feasibility of methanol or methyl fuel produced from coal using existing technology is discussed. Other factors considered include environmental, safety, toxicity, transportation, so storage, ease of burning, and retrofitting of present boilers. Demonstrations of its uses as a boiler fuel and as a turbine fuel are cited. J.M.S.

N79-27620# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
SOLAR RADIATION ABSORPTION STUDIES IN THE ATMOSPHERE AND OCEAN USING A TWO STREAM METHOD [BERECHNUNGEN DES SOLAREN STRAHLUNGSTRANSPORTES IN ATMOSPHERE UND OZEAN MIT HILFE EINER ZWEISTROMMETHODE]
Michael Kerschgens Jan. 1978 104 p refs In GERMAN Sponsored by Deut. Forschungsgemeinschaft
(Mitt-25) Avail: NTIS HC A06/MF A01

This approximation method with variable parameters for the scattering field was applied to vertical inhomogeneous atmospheric and ocean models. VA 0.2 to 3.58 nanometer wavelength range was considered. The atmospheric model extends up to a height of 70 km. The solar spectrum is divided into 37 intervals. An exponential series was developed to describe the transmission characteristics of water vapor and C02. The influence of parameters such as cloud heights, liquid water contents, optical thicknesses, and aerosol contents was studied. The effects of vertical homogeneous and inhomogeneous plankton distributions on radiation profiles were determined for a mixed ocean--atmosphere model. Variations in upper plankton concentrations increase the albedo in the visible spectrum by a factor of 2 or 3, but play little part in warming the ocean. Author (ESA)

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N79-27621 Arizona Univ., Tucson.
ANALYSIS OF FACTORS AFFECTING WATER LEVEL RECOVERY DATA Ph.D. Thesis
David Robert Hargis 1979 213 p
Avail: Univ. Microfilms Order No. 7914437

Water recovery data collected in wells following controlled pumping tests are affected by both borehole and formation factors. The borehole factors comprise those effects attributed to the presence of the wellbore, such as step-increases in pumping rate, wellbore storage, well efficiency, and skin effects. The formation factors comprise those effects associated with the geologic environment in which an aquifier system occurs, such as variation of the coefficient of storage, and aquifer barrier boundaries. Analysis and interpretation of water level data collected in 59 wells following controlled pumping tests in aquifers of various rock types indicate that, in general, the shape of the recovery plot can be used to diagnose the presence of skin

effects, low well efficiency, wellbore storage, and variation of the coefficient of storage. Dissert. Abstr.

N79-27622 Clark Univ., Worcester, Mass.
SHORT TERM SEDIMENT MOVEMENTS AND RELATED CHANNEL CHARGES: THE PICEANCE BASIN, COLORADO Ph.D. Thesis
William Harvey Renwick 1979 178 p
Avail: Univ. Microfilms Order No. 7915921

The spatial and temporal patterns of the sediment transport system of the semiarid Piceance Basin, Northwestern Colorado were examined. Field measurements of erosion rates and a theoretical analysis of the conditions of channel change are used. Hillslope erosion was monitored by the U.S. Geological Survey at five small erosion plots. Erosion in gullies and on the steep sides of entrenched channels was monitored with nail transects. Changes in channel storage of alluvium were estimated with surveyed cross sections and nail transects in eight basins ranging in area from 1.01 to 27.14 square kilometers discharge and sediment load were measured in three of these basins. Dissert. Abstr.

N79-27623 Illinois Univ. at Urbana-Champaign.
MINERALOGY AND CHEMISTRY OF SOME UNUSUAL CLAY DEPOSITS IN THE AMARGOSA DESERT, SOUTHERN NEVADA Ph.D. Thesis
Hani Nicola Khoury 1979 185 p
Avail: Univ. Microfilms Order No. 7915375

The formation and classification of valuable clays found in southern Nevada are discussed. Dissert. Abstr.

N79-27624 Pennsylvania State Univ., University Park.
APPLICATION OF THE UNIT REGIONAL VALUE CONCEPT TO A STUDY OF THE MINERAL RESOURCES OF AUSTRALIA Ph.D. Thesis
P. Richard Engelder 1979 374 p
Avail: Univ. Microfilms Order No. 7915710

The mineral resources of Australia and each of the states of Australia were evaluated. A black box consisting of two inputs: geologic and socio-economic variables, and one output: mineral production, is used to model this mineral resource system. Each of these three variables, as well as their interactions, are analyzed. The diversity of geology as measured by the I.G.D. and s-I of the time-petrographic units is investigated for each of the states of Australia. This information is utilized to select well developed regions which are similar to the less well developed states of Australia. These locations are compared in order to predict the mineral commodities which have not been produced in the underdeveloped areas. Dissert. Abstr.

N79-27625 California Univ., Berkeley.
WIND MIXING IN LAKES Ph.D. Thesis
Robert Hays Spigel 1978 292 p
Avail: Univ. Microfilms Order No. 7914777

An analysis of the time scales of processes relevant to wind mixing in lakes indicates that the response of a lake to wind may be classified into four regimes with respect to thermocline deepening behavior, depending on the relative sizes of the parameters describing wind strength, basin size, and stratification. The dependence is described in terms of a mixed layer Richardson number and the aspect ratio of the mixed layer thickness to length. Entrainment and mean motions interact through the production of turbulent kinetic energy by velocity shear at the base of the mixed layer. The nature of this interaction is investigated, and scales for velocity shear, stable interface thickness, and times for internal seiching, internal wave decay, and vertical and longitudinal mixing are developed. Also based on the scaling is a computer algorithm parameterizing the effects of shear production on mixed layer deepening. Dissert. Abstr.

N79-27626 Ain Shams Univ., Cairo (Egypt).
EGYPT AS SEEN BY LANDSAT
Farouk El-Baz [1979] 160 p Partly in ENGLISH; partly in ARABIC Prepared in cooperation with Smithsonian Institution, Washington, D. C. Original contains color illustrations
Avail: Dar Al-Maares, 1119 Corniche, El-Nil, Cairo, Egypt HC 11 Egyptian pounds

The land area and territorial waters of Egypt are presented. The LANDSAT images allow for the geology of the region to be studied. LANDSAT imagery has two advantages over other imagery: (1) The LANDSAT images provide complete coverage of Egypt at the same scale; and (2) Because LANDSAT images are all taken vertically, they are suitable for planimetric mapping and direct horizontal distance measurements. R.E.S.

N79-27627 International Institute for Applied Systems Analysis, Laxenburg (Austria).
SUPPLY-DEMAND PRICE COORDINATION IN WATER RESOURCES MANAGEMENT
G. Guariso (Politech. di Milan), D. Maidment, S. Rinaldi (Politech. di Milan), and R. Soncini-Sessa (Politech. di Milan) Jul. 1978 31 p refs Sponsored in part by Volkswagen Found.
(Grants RF-75033; GA-NES-7712)
(IIASA-RR-78-11) Copyright. Avail: Issuing Acitivity

A scheme is proposed for the coordination, by pricing, of water supply and demand in a region. The objective is to maximize the total regional net benefit from water use which is achieved when the marginal benefit at each demand point is equal to the marginal cost of delivering water to that point. The class of problems to which the scheme can be applied is determined from the graph of the network interrelating sources and demand. An example is presented in which the scheme can be applied is determined from the graph of the network interrelating sources and demand. An example is presented in which the scheme is applied to analyze possible interbasin water transfers in the Northwest Water Plan in Mexico. Author (ESA)

N79-27628 International Institute for Applied Systems Analysis, Laxenburg (Austria).
ON FOSSIL FUEL RESERVES AND RESOURCES
Michel Grenon Jun. 1978 46 p refs
(IIASA-RM-78-35) Copyright. Avail: Issuing Acitivity

Three independent studies assessing fossil fuel resources and reserves of coal, oil, and gas with their possible maximum production until 2020 are presented. Estimates and predictions are based on technical and economic considerations, but exclude political ones. These aspects are put into perspective with the current thinking of the majority of experts in this field and used to estimate some possible future production in relation to demand scenario for the world in the year 2030. Results and conclusions drawn are considered to be conservative. Author (ESA)

N79-27629*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LARGE AREA CROP INVENTORY EXPERIMENT (LACIE). AN EARLY ESTIMATE OF SMALL GRAINS ACREAGE
Robert N. Lea and Dennis M. Kern, Principal Investigators (NRC) Mar. 1979 48 p refs Sponsored by NASA, NOAA, and USDA
EREP
(E79-10212; NASA-TM-80446; JSC-14782; Rept-79-FM-13) Avail: NTIS HC A03/MF A01 CSCL 02C

There are no author-identified significant results in this report.

N79-27630*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EVALUATION OF REGISTRATION, COMPRESSION AND CLASSIFICATION ALGORITHMS. VOLUME 1: RESULTS
R. Jayroe, R. Atkinson, L. Callas, J. Hodges, B. Gaggini, and J. Peterson Feb. 1979 126 p refs 2 Vol.
(NASA-TM-78227-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 05B

The registration, compression, and classification algorithms were selected on the basis that such a group would include most of the different and commonly used approaches. The results of the investigation indicate clearcut, cost effective choices for registering, compressing, and classifying multispectral imagery. R.E.S.

N79-27631*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EVALUATION OF REGISTRATION, COMPRESSION AND CLASSIFICATION ALGORITHMS. VOLUME 2: DOCUMENTATION

R. Jayroe, R. Atkinson, L. Callas, J. Hodges, B. Gaggini, and J. Peterson Feb. 1979 330 p refs 2 Vol.
(NASA-TM-78227-Vol-2) Avail: NTIS HC A15/MF A01 CSCL 05B

The IBM-360 FORTRAN listings of the algorithms used in the investigation are presented in this programmer's user manual. R.E.S.

N79-27632*# Connecticut Univ., Storrs. Dept. of Civil Engineering.
DOCUMENTATION OF A GROUND HYDROLOGY PARAMETERIZATION FOR USE IN THE GISS ATMOSPHERIC GENERAL CIRCULATION MODEL
J. D. Lin, J. Aleano, and P. Bock Jun. 1978 143 p refs
(Grant NsG-5075)
(NASA-CR-158766; CE-79-126) Avail: NTIS HC A07/MF A01 CSCL 08H

The moisture transport processes related to the earth's surface relevant to the ground circulation model GCM are presented. The GHM parametrizations considered are: (1) ground wetness and soil parameters; (2) precipitation; (3) evapotranspiration; (4) surface storage of snow and ice; and (5) runout. The computational aspects of the GHM using computer programs and flow charts are described. M.M.M.

N79-27633*# University of Southern California, Los Angeles. Inst. for Marine and Coastal Studies.
THEORY OF SPECTRAL RADIANCE OF POLLUTANTS AT SEA, VOLUME 1 Final Report
Jun. 1979 42 p refs 2 Vol.
(Grant NsG-1528)
(NASA-CR-158791) Avail: NTIS HC A03/MF A01 CSCL 13B

Remote measurement of pollutants dumped in the sea, not oil slicks, but soluble pollutants that change the color of the water, is addressed. The sensor is a spectral radiometer that flies over the polluted area and compares its spectral radiance (color) to that of surrounding clean seawater. The goal is to infer the concentration of pollutants using the measured radiance of the sea compared to laboratory measurements of reflection and transmission spectra of the pollutants. The subject is treated in three steps: (1) the quantities involved are defined and means for measuring them are described; (2) the equations for remote sensing with a low-flying aircraft are derived, in which wase the absorption and radiance of intervening air is negligible; and (3) high-flying aircraft and satellites are applied, in which case the radiance of intervening air is the major problem. G.Y.

N79-27634*# University of Southern California, Los Angeles. Inst. for Marine and Coastal Studies.
SATELLITE PASSIVE REMOTE SENSING OF OFF-SHORE POLLUTANTS, VOLUME 2 Final Report
Jun. 1979 46 p 2 Vol.
(Grant NsG-1528)
(NASA-CR-158792) Avail: NTIS HC A03/MF A01 CSCL 13B

Satellite detection and monitoring of off-shore dumped pollutants, other than oil, are discussed. Summaries of satellite sensor performance in three spectral bands (visible, infrared, and microwave) are presented. The bulk of the report gives all the calculations, trade-offs and limitations of the three sensor systems. It is asserted that the problem of pollution monitoring is not a sensor problem but a problem of mathematical modeling and data processing. G.Y.

N79-27635*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AN ALGORITHM FOR RETRIEVAL OF OCEAN SURFACE AND ATMOSPHERIC PARAMETERS FROM THE OBSERVATIONS OF THE SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMMR)
T. T. Wilheit and A. T. C. Chang May 1979 36 p refs Submitted for publication
(NASA-TM-80277) Avail: NTIS HC A04/MF A01 CSCL 08C

A formalism was developed which can be used to interpret the data in terms of sea surface temperature, sea surface wind speed, and the atmospheric overburden of water vapor and liquid water. It was shown with reasonable instrumental performance assumptions, these parameters could be derived to useful accuracies. Although the algorithms were not derived for use in rain, it is shown that, at least, token rain rates can be tolerated without invalidating the retrieved geophysical parameters. R.E.S.

N79-27636*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DIRECTIONAL SPECTRA OF OCEAN WAVES FROM MICROWAVE BACKSCATTER: A PHYSICAL OPTICS SOLUTION WITH APPLICATION TO THE SHORT-PULSE AND TWO-FREQUENCY MEASUREMENT TECHNIQUES
Frederick C. Jackson Jun. 1979 31 p refs Submitted for publication
(NASA-TM-80295) Avail: NTIS HC A03/MF A01 CSCL 08C

Two simple microwave radar techniques that are potentially capable of providing routine satellite measurements of the directional spectrum of ocean waves were developed. One technique, the short pulse technique, makes use of very short pulses to resolve ocean surface wave contrast features in the range direction; the other technique, the two frequency correlation technique makes use of coherency in the transmitted waveform to detect the large ocean wave contrast modulation as a beat or mixing frequency in the power backscattered at two closely separated microwave frequencies. A frequency domain analysis of the short pulse and two frequency systems shows that the two measurement systems are essentially duals; they each operate on the generalized (three frequency) fourth-order statistical moment of the surface transfer function in different, but symmetrical ways, and they both measure the same directional contrast modulation spectrum. A three dimensional physical optics solution for the fourth-order moment was obtained for backscatter in the near vertical, specular regime, assuming Gaussian surface statistics. Author

N79-27637*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RADIOMETRIC RESOLUTION FOR MONITORING VEGETATION: HOW MANY BITS ARE NEEDED?
Compton J. Tucker May 1979 32 p refs Submitted for publication
(NASA-TM-80293) Avail: NTIS HC A03/MF A01 CSCL 02F

The significance of the various number of radiometric quantizing levels required for satellite monitoring of vegetation resources was evaluated by using in situ collected spectral reflectance data, an atmospheric radiative transfer simulation model, and a satellite sensor simulation model. Reflectance data were converted to radiance data; passed through a model atmosphere to an altitude of 706 km; and subsequently quantized at 16, 32, 64, 128, 256, and 512 digital count levels for Thematic Mapper bands TM3(0.63 - 0.69 microns) and TM4(0.76 - 0.90 microns). The simulated digital count data were regressed against the in situ biological data to quantify the relationship between quantizing levels. Author

N79-27638*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RELATIONSHIP OF RED AND PHOTOGRAPHIC INFRARED SPECTRAL RADIANCES TO ALFALFA BIOMASS, FORAGE WATER CONTENT, PERCENTAGE CANOPY COVER, AND SEVERITY OF DROUGHT STRESS
Compton J. Tucker, J. H. Elgin, Jr. (USDA, Beltsville, Md.), and J. E. McMurtrey, III (USDA, Beltsville, Md.) Apr. 1979 19 p refs Submitted for publication
(NASA-TM-80272) Avail: NTIS HC A02/MF A01 CSCL 02F

Red and photographic infrared spectral data were collected using a handheld radiometer for two cuttings of alfalfa. Significant linear and non-linear correlation coefficients were found between the spectral variables and plant height, biomass, forage water content, and estimated canopy cover for the earlier alfalfa cutting. The alfalfa of later cutting experienced a period of severe drought stress which limited growth. The spectral variables were found to be highly correlated with the estimated drought scores for this alfalfa cutting. Author

N79-27639*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REMOTE SENSING OF LEAF WATER CONTENT IN THE NEAR INFRARED
C. J. Tucker May 1979 23 p refs Submitted for publication
(NASA-TM-80291) Avail: NTIS HC A03/MF A01 CSCL 02F

A stochastic leaf radiation model was used to predict leaf spectral reflectance as a function of leaf water content for a dicot leaf. Simulated spectral reflectances, corresponding to different leaf water contents or equivalent water thicknesses, were analyzed to quantify reflectance differences between different equivalent water thicknesses. Simulation results coupled with consideration of atmospheric transmission properties and the incident solar spectral irradiance at the earth's surface resulted in the conclusion that the approximately 1.55 - 1.75 microns region was the best suited wavelength interval for satellite-platform remote sensing of plant canopy water status in the 0.7 - 2.5 microns region of the spectrum. Author

N79-27640*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A MODEL FOR THE MICROWAVE EMISSIVITY OF THE OCEAN'S SURFACE AS A FUNCTION OF WIND SPEED
Thomas T. Wilheit Apr. 1979 25 p refs Submitted for publication
(NASA-TM-80278) Avail: NTIS HC A02/MF A01 CSCL 08C

A quanitative model is presented which describes the ocean surface as a ensemble of flat facets with a normal distribution of slopes. The variance of the slope distribution is linearly related to frequency up to 35 GHz and constant at higher frequencies. These facets are partially covered with an absorbing nonpolarized foam layer. Experimental evidence is presented for this model. Author

N79-27641# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
DETERMINATION OF HOMOGENEOUS ZONES BY REMOTE SENSORS [DETERMINACAO DE ZONAS HOMOGENEAS ATRAVES DE SENSORIAMENTO REMOTO]
Adalton Paes Manso, Maria de Lourdes Neves deOliveira, and Maria Suelena Santiago Barros Apr. 1979 36 p refs In PORTUGUESE; ENGLISH summary
(INPE-1470-RPE/021) Avail: NTIS HC A03/MF A01

The urban community is neither an undefined and undifferentiated grouping, nor a casual reunion of buildings and people. From the standpoint of residential differentiation, a city presents areas which, with the consideration of their occupation, have acquired the character, culture and the qualities imposed by their inhabitants. An attempt was made to define a methodology which will allow a concise and objective identification of such groups. The technique is used is that of visual interpretation of low altitude images, obtained by remote sensing devices on panchromatic films. The cities of Sao dos Campos (1973 and 1977) and Cachoeira Paulista (1975) were used as test areas. G.Y.

N79-27642# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
CLASSIFICATION OF MULTISPECTRAL IMAGES OF NATURAL RESOURCES USING TABLE LOOK-UP APPROACH AND CLUSTERING [CLASSIFICACAO DE IMAGENS MULTI-ESPECTRAIS DE RECURSOS NATURAIS USANDO TABLE LOOK-UP E AGREGACAO]
Nelson I. Tanaka, Renato H. L. Pedrosa, and Nelson D. A. Mascarenhas Mar. 1979 105 p refs In PORTUGUESE; ENGLISH summary
(INPE-1439-TDL/006) Avail: NTIS HC A06/MF A01

Two computational methods were implemented, with the objective of optimizing the classification time of earth resources multispectral images, obtained through the LANDSAT. Both methods were based on the table look-up approach: one uses two tables and the other uses a data structure accessed through hashing. Furthermore, a classification system using clustering was also implemented, based on the ISODATA algorithm. Author

N79-27643# Department of Energy, Washington, D. C. Energy Information Administration.
RE-EXAMINATION OF UNDISCOVERED OIL RESOURCES IN THE UNITED STATES
Dec. 1978 24 p refs
(DOE/EIA-0103/9) Avail: NTIS HC A02/MF A01

An estimate of total producible oil in the United States was determined. Approximately 198 billion barrels are ultimately recoverable and producible of which 113.8 billion barrels were produced through the end of 1977. M.M.M.

N79-27644# Market Facts, Inc., Washington, D. C.
SHALE OIL: FOCUS GROUP RESULTS
Aug. 1978 74 p
(Contract EV-78-C-01-6458)
(DOE/TIC-10019) Avail: NTIS HC A04/MF A01

The focus group research on oil shale development prepared for the Department of Energy as part of the commercialization program is reported. The research is devoted to evaluation of the potential for commercialization of oil shale, determination of the barriers to development of this resource, and evaluation of actions required by the federal government to promote commericialization. DOE

N79-27645# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).
THE TERGRA MODEL: A MATHEMATICAL MODEL FOR THE SIMULATION OF THE DAILY BEHAVIOR OF CROP SURFACE TEMPERATURE AND ACTUAL EVAPOTRANSPIRATION
G. J. R. Soer Nov. 1977 53 p refs
(Rept-1014) Avail: NTIS HC A04/MF A01

The TERGRA model was developed as an aid for the interpretation of IRL images of cropped surfaces, with particular emphasis on grasslands. It is based on the transport equations for one-dimensional vertical heat and moisture flow in the soil-plant-atmosphere continum. Boundary conditions are the temperature and soil moisture pressure at a reference level in the soil, the energy balance equation of the crop surface, and the temperature and water vapor pressure at a reference level in the atmosphere. Some relations between model parameters are introduced in the model. A numerical algorithm to solve the transport equation completes the model. Model test results show good agreement with actual measurements done at the Losser study area. Author (ESA)

N79-27646# Research Inst. of National Defence, Stockholm (Sweden).
PROGRAM LIBRARY FOR HANDLING AND PROCESSING OF REMOTELY SENSED MULTISPECTRAL DATA
S. Ingvar Aakersten and Lars-Erik Gustafsson Sep. 1978 94 p refs Revised
(FOA-C-30146-E1) Avail: NTIS HC A05/MF A01

A brief user's guide to a system of computer programs for the handling, processing, and analysis of multispectral pictorial data is presented. The system is implemented on an IBM 370/165 at the Stockholm computer center. The programs are used in batch processing with one specially prepared source deck for every separate application task. Examples are given of typical combinations of tasks for image generation and type area identification starting with appropriately edited digital data. Author (ESA)

N79-27607*# Bituminous Coal Research, Inc., Monroeville, Pa.
COAL SUPPLY FOR CALIFORNIA
Joseph J. Yancik *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 111-120 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 08G

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N79-27647* National Aeronautics and Space Administration, Washington, D. C.
ENERGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, ISSUE 21
Apr. 1979 503 p
(NASA-SP-7043(21)) Avail: NTIS HC E07 CSCL 10B

This bibliography lists 1873 reports, articles, and other documents introduced into the NASA scientific and technical information system from January 1, 1979 through March 31, 1979. Author

N79-27648 California Univ., Los Angeles.
A LARGE SCALE WIND ENERGY PROGRAM FOR THE STATE OF CALIFORNIA Ph.D. Thesis
Matania Ginosar 1978 164 p
Avail: Univ. Microfilms Order No. 7915662

The rationale for a large-scale wind-electric energy program for California is proposed and provided. It is written for decision makers; therefore, simplified calculations and explanations are used throughout. The plan is based on the idea that time is one of the most critical elements in developing renewable energy supplies. The plan concentrates on three areas: (1) wind resource exploration and development; (2) operation testing of existing and new designs; and (3) development of six large-scale wind turbine prototypes suited for California. Dissert. Abstr.

N79-27649 North Dakota Univ., Grand Forks.
HEAT FLOW AND HEAT PRODUCTION STUDIES IN NORTH DAKOTA Ph.D. Thesis
Richard Scattolini 1978 316 p
Avail: Univ. Microfilms Order No. 7914090

Thirty-one heat flow determinations in North Dakota range from 0.6 to 1.9 HFU. The majority of heat flow measurements were completed for southwestern North Dakota. Heat flow measurements were made in both oil and water wells. Heat production data from basement rocks, when used in conjunction with nearby heat flow values, indicate that only two of six sites may be considered to be similar to Basin and Range type of heat flow. The major conclusion is that a heat flow province transition between Basin and Range and eastern United States types of heat flow occurs west of 103 degrees W longitude in southwestern North Dakota. There is coincidence between the heat flow results reported here and a zone of anomalous electrical conductivity, although the transition is better delineated by the heat flow data. Dissert. Abstr.

N79-27650 California Univ., Berkeley.
ALGAL GROWTH KINETICS IN BIOCONVERSION OF SOLAR ENERGY Ph.D. Thesis
Joseph Charles Weissman 1978 329 p
Avail: Univ. Microfilms Order No. 7914808

A theoretical and experimental study of algal growth kinetics was undertaken to evaluate potential applications of algal culture in the conversion of solar energy. Models of photosynthesis and nutrient utilization were reviewed and then selectively used to guide studies of hydrogen production and nitrogen fixation by a cyanobacterium, studies of cell feedback and species competition in continuous culture, and experimental outdoor cultivation of algae on wastewater. Nitrogen-limited cultures of the alga Anabaena cylindrica were used to produce hydrogen and oxygen continuously for seven to nineteen days. A detailed theoretical and laboratory study was carried out to evaluate various ways of operating continuous hydraulic systems in terms of productivity, stability and species control. Dissert. Abstr.

N79-27651 California Univ., Berkeley.
SOME ANALYTIC MODELS OF PASSIVE SOLAR BUILDING PERFORMANCE: A THEORETICAL APPROACH TO THE DESIGN OF ENERGY-CONSERVING BUILDINGS Ph.D. Thesis
David Baird Goldstein 1978 366 p
Avail: Univ. Microfilms Order No. 7914615

Analytic models of heat transfer in buildings are derived to describe the response of room temperature to weather conditions and to internal heat sources. The models are used to predict the behavior of several passive solar buildings. Model predictions can be used as a tool in the design of buildings for low energy use in heating and cooling. The form of the models' solution can yield physical insight into some of the important parameters of building thermal performance. Dissert. Abstr.

N79-27652 International Institute for Applied Systems Analysis, Laxenburg (Austria).
A REVIEW OF ENERGY MODELS. PART 4: JULY 1978
J.-M. Beaujean, ed. and J.-P. Charpentier, ed. Jul. 1978 57 p ref
(IIASA-RR-78-11-Pt-4) Copyright. Avail: Issuing Acitivity

Fourteen energy models are classified and briefly reviewed. Previous reviews have shown that energy models linking energy systems to the averall economy are seldom presented. Three models of this type are described. They are the Swedish model, Coal I, and the model of the refining industry in Belgium. Author (ESA)

N79-27653 Commission of the European Communities, Brussels (Belgium).
THE COMPARISON AND COORDINATION OF NATIONAL POLICIES AND PROGRAMS IN THE ENERGY RESEARCH AND DEVELOPMENT SECTOR [LA COMPARAISON ET LA COORDINATION DES POLITIQUES ET PROGRAMMES NATIONAUX DE RECHERCHE ET DEVELOPPEMENT DANS LE SECTEUR DE L'ENERGIE]
1978 184 p In FRENCH
(EUR-5911; ISBN-92-825-0179-5) Copyright. Avail: Issuing Activity

The energy research and development program of the member states of the EEC are compared. The scope of future coordination of policies was investigated under the auspices of CREST. From an inventory of the public sector expenditure of each member state and an identification of priorities, a common program covering energy conservation, geothermal energy, solar energy, hydrogen production, and systems modelling was drawn up. Member states submitted brief outlines of their short and medium term targets and priorities for national energy policies, with broader descriptions of the human and financial resources allocated to programs and projects under way in the public and private sectors. These are given in the appendices. Author (ESA)

N79-27654*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PERFORMANCE PREDICTION EVALUATION OF CERAMIC MATERIALS IN POINT-FOCUSING SOLAR RECEIVERS
J. Ewing and J. Zwissler 1 Jun. 1979 55 p refs Sponsored in part by DOE
(Contract NAS7-100)
(NASA-CR-158774; JPL-Pub-79-58; DOE/JPL-1060-23) Avail: NTIS HC A04/MF A01 CSCL 10A

A performance prediction was adapted to evaluate the use of ceramic materials in solar receivers for point focusing distributed applications. System requirements were determined including the receiver operating environment and system operating parameters for various engine types. Preliminary receiver designs were evolved from these system requirements. Specific receiver designs were then evaluated to determine material functional requirements. R.E.S.

N79-27655*# Astro Research Corp., Carpinteria, Calif.
STUDY OF MEMBRANE REFLECTOR TECHNOLOGY Final Report
Karl Knapp and John Hedgepeth 2 Jan. 1979 39 p Sponsored by NASA Prepared for JPL
(Contract JPL-955081)
(NASA-CR-158729; ARC-TN-1071; JPL-9950-104) Avail: NTIS HC A03/MF A01 CSCL 10A

Very large reflective surfaces are required by future spacecraft for such purposes as solar energy collection, antenna surfaces, thermal control, attitude and orbit control with solar pressure, and solar sailing. The performance benefits in large membrane reflector systems, which may be derived from an advancement of this film and related structures technology, are identified and qualified. The results of the study are reported and summarized. Detailed technical discussions of various aspects of the study are included in several separate technical notes which are referenced. G.Y.

N79-27656*# Florida Solar Energy Center, Cape Canaveral.
THERMAL PERFORMANCE EVALUATION OF THE SEMCO (LIQUID) SOLAR COLLECTOR
May 1979 39 p Prepared for DOE
(Contract NAS8-32248)
(NASA-CR-161230) Avail: NTIS HC A03/MF A01 CSCL 10A

Procedures used and results obtained during the evaluation test program on a flat plate collector which uses water as the working fluid are discussed. The absorber plate is copper tube soldered to copper fin coated with flat black paint. The glazing consists of two plates of Lo-Iron glass; the insulation is polyurethane foam. The collector weight is 242.5 pounds with overall external dimensions of approximately 48.8 in. x 120.8 in. x 4.1 in. The test program was conducted to obtain thermal performance data before and after 34 days of weather exposure test. A.R.H.

N79-27657*# Wyle Labs., Inc., Huntsville, Ala. Solar Energy Systems Div.
INDOOR TEST FOR THERMAL PERFORMANCE EVALUATION OF SEVEN ELCAM FIN-TUBE SOLAR COLLECTOR CONFIGURATIONS
Jun. 1979 33 p Prepared for NASA and DOE
(Contract NAS8-32036)
(NASA-CR-161236; Wyle-TR-531-29) Avail: NTIS HC A03/MF A01 CSCL 10A

The test procedure used and the results obtained from an evaluation test program conducted to obtain thermal performance data on seven Elcam fin-tube solar collector configurations under simulated conditions are described. These tests were made using the Marshall Space Flight Center solar facilities. The Elcam fin-tube (liquid) solar collectors each consist of an absorber plate 5.9 inches wide by 83 inches long and a type M copper tube of 0.569 inch nominal inside diameter. No cover plate was used with any of the specimens. The uniqueness of each of the seven configurations is described, and tests were performed on each separate configuration. G.Y.

N79-27658*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
POTENTIAL FOR COGENERATION OF HEAT AND ELECTRICITY IN CALIFORNIA INDUSTRY, PHASE 2 Final Report
H. S. Davis, E. Edelson, A. K. Kashani, and M. L. Slonski 1 Jan. 1979 182 p refs Sponsored in part by DOE
(Contract NAS7-100)
(NASA-CR-158772; JPL-Pub-78-109) Avail: NTIS HC A09/MF A01 CSCL 10B

The nontechnical issues of industrial cogeneration for 12 California firms were analyzed under three categories of institutional settings: (1) industrial ownership without firm sales of power; (2) industrial ownership with firm sales of power; and (3) utility or third party ownership. Institutional issues were analyzed from the independent viewpoints of the primary parties of interest: the industrial firms, the electric utilities and the California Public utilities Commission. Air quality regulations and the agencies responsible for their promulgation were examined, and a life cycle costing model was used to evaluate the economic merits of representative conceptual cogeneration systems at these sites. Specific recommendations were made for mitigating measures and regulatory action relevant to industrial cogeneration in California. Author

N79-27659*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PROCEEDINGS OF THE DISTRIBUTION AUTOMATION AND CONTROL WORKING GROUP. VOLUME 2: PROCEEDINGS
R. Caldwell Mar. 1979 127 p Working Group held at Baltimore, 20-22 Nov. 1978 Sponsored in part by DOE
(Contract NAS7-100)
(NASA-CR-158769; JPL-Pub-79-35-Vol-2) Avail: NTIS HC A03/MF A01 CSCL 10B

The meeting provided a forum in which electric utilities could communicate with each other, with DOE, and with DOE's contractors regarding research, development, and demonstration efforts to apply DAC (Distribution Automation and Control) to the electric power system. In the discussions emphasis was to be placed on identifying the priorities and needs for DAC development. Author

N79-27660*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE EFFECTS OF REGIONAL INSOLATION DIFFERENCES UPON ADVANCED SOLAR THERMAL ELECTRIC POWER PLANT PERFORMANCE AND ENERGY COSTS
A. F. Latta, J. M. Bowyer, T. Fujita, and P. H. Richter 15 Mar. 1979 116 p refs Prepared for DOE
(Contract NAS7-100; JPL Proj. 5102-115)
(NASA-CR-158768; JPL-Pub-79-39; DOE/JPL-1060-17) Avail: NTIS HC A06/MF A01 CSCL 10B

The performance and cost of the 10 MWe advanced solar thermal electric power plants sited in various regions of the continental United States were determined. The regional insolation data base is discussed. A range for the forecast cost of conventional electricity by region and nationally over the next several cades are presented. S.E.S.

N79-27661*# South Dakota School of Mines and Technology, Rapid City.
SOLAR ENERGY SYSTEM INSTALLED AT MOUNT RUSHMORE NATIONAL VISITOR CENTER IN KEYSTONE, SOUTH DAKOTA Final Report
Jun. 1979 42 p Sponsored by NASA
(Contract EX-76-C-01-2399)
(NASA-CR-161238) Avail: NTIS HC A03/MF A01 CSCL 10A

The design and installation of the solar energy system installed at the Mount Rushmore Visitor Center is described. The system was designed to furnish about 45 percent of the heating for the total facility and about 53 percent partial cooling for the 2000 square foot observatory. R.E.S.

N79-27662*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TEST OF CONCENTRATOR SOLAR ARRAY MODEL FOR SEPS
H. H. Huie May 1979 78 p
(NASA-TM-78230) Avail: NTIS HC A05/MF A01 CSCL 10A

The use of concentrators to improve the performance of solar arrays in deep space was tested in a simulated deep space environment. The results of these tests are presented and discussed. Areas of discussion include cell temperature performance in a low temperature, low illumination environment with and without concentration, concentration ratios, and theoretical analysis versus test results. Tests were conducted on a series/parallel configuration and individual cells. Author

N79-27663*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ENERGY-STATE FORMULATION OF LUMPED VOLUME DYNAMIC EQUATIONS WITH APPLICATION TO A SIMPLIFIED FREE PISTON STIRLING ENGINE
Carl J. Daniele and Carl F. Lorenzo 1979 30 p refs Presented at the Soc. for Computer Simulation, Pittsburgh, 21-22 May 1979
(NASA-TM-79197; E-075) Avail: NTIS HC A03/MF A01 CSCL 10B

Lumped volume dynamic equations are derived using an energy state formulation. This technique requires that kinetic and potential energy state functions be written for the physical system being investigated. To account for losses in the system, a Rayleigh dissipation function is formed. Using these functions, a Lagrangian is formed and using Lagrange's equation, the equations of motion for the system are derived. The results of the application of this technique to a lumped volume are used

to derive a model for the free piston Stirling engine. The model was simplified and programmed on an analog computer. Results are given comparing the model response with experimental data. Author

N79-27664*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REDUCTION OF PARTICULATE CARRYOVER FROM A PRESSURIZED FLUIDIZED BED
R. W. Patch 1979 22 p refs Presented at 2d Symp. on the Transfer and Utilization of Particulate Control Technol., Denver, Colo., 23-27 Jul. 1979
(NASA-TM-79216; E-106) Avail: NTIS HC A02/MF A01 CSCL 10B

A bench scale fluidized bed combustor was constructed with a conical shape so that the enlarged upper part of the combustor would also serve as a granular bed filter. The combustor was fed coal and limestone. Ninety-nine tests of about four hours each were conducted over a range of conditions. Coal-to-air ratio varied from 0.033 to 0.098 (all lean). Limestone-to-coal ratio varied from 0.06 to 0.36. Bed depth varied from 3.66 to 8.07 feet. Temperature varied from 1447 to 1905 F. Pressure varied from 40 to 82 psia. Heat transfer area had the range zero to 2.72 ft squared. Two cone angles were used. The average particulate carry over of 2.5 grains/SCF was appreciably less than cylindrical fluidized bed combustors. The carry over was correlated by multiple regression analysis to yield the dependence on bed depth and hence the collection efficiency, which was 20%. A comparison with a model indicated that the exhaust port may be below the transport disengaging height for most of the tests, indicating that further reduction in carry over and increase in collection efficiency could be affected by increasing the freeboard and height of the exhaust port above the bed. Author

N79-27665*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ENERGY AND COST SAVING RESULTS FOR ADVANCED TECHNOLOGY SYSTEMS FROM THE COGENERATION TECHNOLOGY ALTERNATIVES STUDY (CTAS)
G. D. Sagerman, G. J. Barna, and R. K. Burns 1979 22 p Presented at AIAA Terrestrial Energy System Conf., Orlando, Fla., 4-6 Jun. 1979
(Contract EC-77-A-31-1062)
(NASA-TM-79213; DOE/NASA/1062-79/2; AIAA-78-1000) Avail: NTIS HC A02/MF A01 CSCL 10A

An overview of the organization and methodology of the Cogeneration Technology Alternatives Study is presented. The objectives of the study were to identify the most attractive advanced energy conversion systems for industrial cogeneration applications in the future and to assess the advantages of advanced technology systems compared to those systems commercially available today. Advanced systems studied include steam turbines, open and closed cycle gas turbines, combined cycles, diesel engines, Stirling engines, phosphoric acid and molten carbonate fuel cells and thermionics. Steam turbines, open cycle gas turbines, combined cycles, and diesel engines were also analyzed in versions typical of today's commercially available technology to provide a base against which to measure the advanced systems. Cogeneration applications in the major energy consuming manufacturing industries were considered. Results of the study in terms of plant level energy savings, annual energy cost savings and economic attractiveness are presented for the various energy conversion systems considered. R.E.S.

N79-27666# California Univ., Los Angeles. Dept. of Chemical, Nuclear and Thermal Engineering.
THEORETICAL AND EXPERIMENTAL ANALYSIS OF ALKALINE ZINC BATTERIES Final Report, Apr. 1976 - 30 Sep. 1978
Douglas N. Bennion, John Newman, Won Guen Sunu, Siddhartha Ghosh, and Bruce M. Eliash Jan. 1979 189 p refs
(Contract F44620-76-C-0098; AF Proj. 2303)
(AD-A067514; UCLA-CNTE-1-1; AFOSR-79-0472TR) Avail: NTIS HC A09/MF A01 CSCL 10/3

The processes that control the useful life time and performance rates in non-flowing zinc electrodes for electrical storage batteries have been investigated. In particular, the chemical reaction rates, concentration, and electrical potential distributions have been predicted theoretically and measured experimentally as functions of position in the electrode and time for both charge, discharge, and multiple cycles. Changes in crystal structure and solid distributions have also been measured and examined theoretically. Similar rates and distributions have been measured and correlated for RAI P2291 ion exchange membrane separators used in zinc secondary batteries such as the nickle-zinc battery (An/KOH, H2O/NiOOH). Distributions in flow through electrodes were also observed experimentally and calculated theoretically, using the copper deposition reaction for experimental convenience. Work was begun on the theoretical description of the nickle oxide electrode. Experimental work is being planned to validate and revise our understanding of how the nickel electrode operates. Work is continuing on measurement of concentration profiles in zinc electrodes. Author (GRA)

N79-27667# Bechtel National, Inc., San Francisco, Calif.
COAL ENERGY CONVERSION OPTIONS FOR NAVY BASES Final Report, Dec. 1978
A. I. McCone, J. D. Ruby, J. W. Dolloff, T. P. Chen, and U. J. Yim Mar. 1979 116 p refs
(Contract N68305-78-C-0036; ZF57571001)
(AD-A067463; CEL-CR-79.005) Avail: NTIS HC A06/MF A01 CSCL 10/2

An overview evaluation of technologies through which coal may replace oil or gas as the primary fuel at Navy bases was performed. Four technologies for manufacturing and utilizing synthetic fuels were considered commercial. These were: low-Btu gas, medium-Btu gas, synthetic natural gas (SNG), and methyl fuel. These technologies were compared with boilers firing cleaned coal or Western coal and with boilers plus scrubbers firing high sulfur Eastern coal. The comparisons were made for a Navy base with a single central 250 x 1,000,000 Btu/hr boiler station, and for four other Navy base configurations with decentralized boilers. The clean coal firing technology led to lower costs than the synthetic fuel technologies in all cases. Medium-Btu gas offers lower costs than coal-fired boilers plus scrubbers in the most decentralized scenario. Fluidized bed combustion, judged to be a future technology, appears to be the lowest cost technology in central plants. Future environmental regulations may preclude burning cleaned or Western coals without SO2 removal. Author (GRA)

N79-27668# Sandia Labs., Albuquerque, N. Mex.
ANALYSIS OF THE POTENTIAL OF WIND ENERGY CONVERSION SYSTEMS
Jack W. Reed 1979 24 p refs Presented at Conf. on Energy Alternatives, Honolulu, 9 Jan. 1979
(Contract EY-76-C-04-0789)
(SAND-78-2099C; Conf-790114-1) Avail: NTIS HC A02/MF A01

The flow of solar energy and wind was reviewed. The time and space distribution of useful wind power are described. Some of the modern machinery that was conceived to capture wind energy was considered. Some limitations to practical wind energy extraction are presented. Available and projected wind power hardware systems are summarized. DOE

N79-27669# California Univ., Livermore. Lawrence Livermore Lab.
PRELIMARY RESULTS OF TESTS OF PROPRIETARY CHEMICAL ADDITIVES, SEEDING, AND OTHER APPROACHES FOR THE REDUCTION OF SCALE IN HYPERSALINE GEOTHERMAL SYSTEMS
J. E. Harrar, F. E. Locke, C. H. Otto, Jr., S. B. Deutscher, R. Lim, W. P. Frey, R. Quong, and L. E. Lorensen Feb. 1979 37 p refs
(Contract W-7405-eng-48)
(UCID-18051) Avail: NTIS HC A03/MF A01

Sections of steel pipe and perforated screens were exposed to the treated brine. Silica precipitation rates in the effluent brine were measured by means of the electrochemical linear polarization resistance technique. Examination of the pipe sections and chemical analysis of the scales were not complete. None of the additives effected a dramatic reduction in scaling rate. Only hydroxyethylcellulose retarded the rate of precipitation of silica

in the effluent brine. Scaling rates could not be measured accurately in the seeding experiment because of its short duration. DOE

N79-27670# Sandia Labs., Albuquerque, N. Mex. Advanced Energy Projects Div.
AERODYNAMIC PERFORMANCE OF THE 17-METRE-DIAMETER DARRIEUS WIND TURBINE
M. H. Worstell Jan. 1979 60 p refs
(Contract EY-76-C-04-0789)
(SAND-78-1737) Avail: NTIS HC A04/MF A01

A two-bladed 17-meter Darrieus vertical-axis wind turbine was field-tested at the Sandia Laboratories wind turbine site. Performance results for seven constant operating speeds are presented along with a discussion of the trends. Predicted performance and experimental test data for two constant speeds are compared. DOE

N79-27671# Lincoln Lab., Mass. Inst. of Tech., Lexington.
ENDURANCE AND SOIL ACCUMULATION TESTING OF PHOTOVOLTAIC MODULES AT VARIOUS MIT/LL TEST SITES
S. E. Forman Sep. 1978 34 p refs
(Contract EY-76-C-02-4094)
(COO-4094-23) Avail: NTIS HC A03/MF A01

Module endurance in various climates is evaluated relative to the 20-year goal and, in addition, the effects of soil accumulation are monitored. Degradation of peak power was measured as a function of time and the physical change caused by weathering have been recorded. To date, of 3400 modules deployed at various sites for periods up to 16 months, only 22 have failed. This level of performance far exceeds all expectations. Site specific electrical and physical degradation and power loss due to soil accumulation are reported for four different types of modules. DOE

N79-27672# Lincoln Lab., Mass. Inst. of Tech., Lexington.
DESIGN DEVELOPMENT AND IMPLEMENTATION OF DATA ACQUISITION SYSTEMS FOR PHOTOVOLTAIC TESTS AND APPLICATIONS PROJECT
J. D. Cremin and H. A. Fenton Sep. 1979 29 p refs
(Contract EY-76-C-02-4094)
(COO-4094-24) Avail: NTIS HC A03/MF A01

The rationale for the structure of the MIT/Lincoln Laboratory data acquisition system used to collect and process data from four field sites is presented. The experience gained in operation of the data system and the future trends in data acquisition hardware and the impact on a PV data management system are discussed. Detailed hardware description including component prices are included in the description of the present Lincoln Laboratory system and a description of a future PV system. DOE

N79-27673# Lincoln Lab., Mass. Inst. of Tech., Lexington.
PHOTOVOLTAIC-POWERED IRRIGATION EXPERIMENTS IN THE UNITED STATES
Ronald W. Matlin 1978 9 p refs Presented at Atelier Pompage Solaire, Perpignam, France, 3-8 Jul. 1978
(Contract EY-76-C-02-4094)
(COO-4094-28; Conf-780773-1) Avail: NTIS HC A02/MF A01

Topics discussed include photovoltaic agricultural testing at Mead, Nebraska and the initiation of activity to develop very small 'microirrigation' systems. The Nebraska experiment generates approximately 25-kW peak power, and tests the application of solar energy to a variety of agricultural tasks including irrigation and crop drying. At the other end of the size spectrum, a 120-watt microirrigation system built to demonstrate a possible alternative to human-powered pumping in developing countries. These two projects are summarized and data gathered during its initial operating period are given. DOE

N79-27674# Argonne National Lab., Ill.
RELIABILITY AND MAINTAINABILITY EVALUATION OF FREEZING IN SOLAR SYSTEMS
P. S. Chopra and R. M. Wolosewicz Sep. 1978 38 p refs
(Contract W-31-109-eng-38)
(ANL/SDP/TM-78-3) Avail: NTIS HC A03/MF A01

Based on a review of 47 operational solar demonstration sites, approximately 30% of these sites experienced freezing problems. Some of these problems were caused by inattention to engineering details. Other problems resulted from a lack of knowledge of the specific requirements of solar systems. The information reviewed on 47 of the operational solar demonstration sites indicated that water-glycol systems should provide more reliable freeze protection than water systems as long as an adequate glycol concentration is installed initially and then maintained. If glycol makeup is required, a manually operated pump is used. The water system freezing problems are due to several factors which are listed. DOE

N79-27675# Argonne National Lab., Ill.
METAL HYDRIDE SOLAR HEAT PUMP AND POWER SYSTEM (HYCSOS)
R. Gorman and P. S. Moritz 1978 8 p refs Presented at AIAA Conf. on Solar Energy, Phoenix, Ariz., 27 Nov. 1978
(Contract W-31-109-eng-38)
(CONF-781133-5) Avail: NTIS HC A02/MF A01

The design, performance, and cost of a solar-powered metal hydride heat pump and power system for use on a residence are presented. The system design, which is limited by heat transfer, was optimized via an iterative computer program. The design process starts with optimizing the thermal transport properties of the hydride-bed-heat exchanger, then traces temperatures and pressures through the operating cycles. The coefficient of performance (COP) of the overall systems is then determined from the thermal losses due to cycling the hydride beds and due to the auxiliary power consumed by freon pumps and air-moving fans. The system, using high temperature solar collector input at 210 F to 280 F, provides heating with a COP of approximately 1.6 and cooling with a COP of approximately 0.6, and electrical power during spring and fall, all for a cost comparable to a solar absorption cooler. DOE

N79-27676# Oregon State Univ., Corvallis. Dept. of Oceanography.
EXPLORATION OF VOLCANIC GEOTHERMAL ENERGY RESOURCES BASED ON RHEOLOGICAL TECHNIQUES
Technical Status Report No. 3, 1 Oct. - 31 Dec. 1978
Gunnar Bodvarssor 1978 5 p
(Contract EY-76-S-06-2227-037)
(DOE/ET/28453-3; RLO/2227/T37-3) Avail: NTIS HC A02/MF A01

Equipment problems and work in progress are reviewed. DOE

N79-27677# Lincoln Lab., Mass. Inst. of Tech., Lexington.
MEAD 25 KILOWATT PHOTOVOLTAIC SYSTEM
L. L. Bucciarelli, J. D. Cremin, H. A. Fenton, R. F. Hopkinson, E. F. Lyon, and W. R. Romaine Jun. 1978 6 p refs Presented at 13th Photovoltaic Specialists Conf. Wash., D. C., 5-8 Jun. 1978
(Contract EY-76-C-02-4094)
(COO-4094-19; Conf-780619-22) Avail: NTIS HC A02/MF A01

The collection of data on solar insolation, photovoltaic array performance, power conditioning equipment performance, and weather is summarized. A comprehensive system of sensors and data logging equipment was installed for the purpose of collecting these data. The system allows for the automatic transmission of all accumulated data on a daily basis to Lincoln Laboratory in Lexington, Massachusetts, for reduction and analysis. DOE

N79-27678# Varta Batterie A.G., Kelkheim (West Germany).
DEMANDS AND EFFECTS OF SOLAR TECHNOLOGY ON ELECTRIC POWER STORAGE
H. A. Kiehne 1978 22 p refs In GERMAN Presented at Systems Exhibition Energy within the Context of the Hannover Fair, Hannover, West Germany, 19 Apr. 1978
(AED-Conf-78-155-047; Conf-7804102-13) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

The electricity storage devices mentioned which are used today in this field of application, are well known types of accumulator batteries. Intensive work is being done to improve them and to make them suitable for solar systems. Reversible fuel cells or the AgO/Zn system are other storage devices mentioned. DOE

N79-27679# Battelle Pacific Northwest Labs., Richland, Wash.
SAMPLING AND ANALYSIS METHODS FOR GEOTHERMAL FLUIDS AND GASES
D. W. Shannon 1978 257 p
(Contract EY-76-C-06-1830)
(PNL-MA-572-APP) Avail: NTIS HC A12/MF A01

Test results are summarized and listed by method. Results obtained for radioactive isotopes present in the brine sample are tabulated. Summaries of values derived from the round robin raw data are presented. DOE

N79-27680# Sandia Labs., Albuquerque, N. Mex.
MIDTEMPERATURE SOLAR SYSTEMS TEST FACILITY TEST RESULTS: EFFECTS OF SEVERE HAILSTORM ON 9 AUGUST 1978
T. D. Harrison Mar. 1979 30 p
(Contract EY-76-C-04-0789)
(SAND-78-2182) Avail: NTIS HC A03/MF A01

The effects of a severe hailstorm August 9, 1978, over an area encompassing the DOE/Sandia MSSTF in Albuquerque, N.M., are discussed. At the time of the hailstorm the MSSTF contained line and point-focusing collectors for converting solar energy to thermal energy, as well as the fluid loops and thermal storage facilities necessary for an STE system and the CMTF. The MSSTF also contains a variety of photovoltaic devices for converting solar energy directly to electrical energy. The effects of the hail on the equipment in each subsystem are described. DOE

N79-27681# Oak Ridge National Lab., Tenn.
ASSESSMENT OF MATERIALS FOR USE IN A SOLAR CERAMIC RECEIVER FOR CHEMICAL PROCESS HEAT
V. J. Tennery and G. W. Weber Feb. 1979 39 p refs
(Contract W-7405-eng-26)
(ORNL/TM-6715) Avail: NTIS HC A03/MF A01

Candidate ceramic materials were evaluated on the basis of two potential temperature operating regimes: 600 to 1300 C and 1300 to 2200 C. Discussion of properties important to the proposed application includes thermal shock resistance, tensile strength, creep resistance, oxidation resistance, vaporization rate, chemical inertness to process reactants and products, cost, and fabricability. Many ceramic materials were considered for the 600 to 1300 C operating regime. On the basis of a significant data base on tensile strength, thermal expansion, thermal conductivity, fabricability, and stability, the leading candidates are identified. DOE

N79-27682# Atomics International, Canoga Park, Calif.
MANUAL FOR THE SOLAR TOTAL ENERGY SYSTEM EVALUATION PROGRAM
B. L. McFarland Feb. 1979 155 p refs
(Contract EY-76-C-03-3210)
(SAND-78-7045) Avail: NTIS HC A08/MF A01

The mathematical models used by the Solar Total Energy System Evaluation Program (STESEP) are described and the way the systems were selected is discussed. The data requirements are defined, the output options and program limitations are described, and sample problems that can be used to ensure proper program operations are discussed. The code itself is described sequentially. A detailed flow diagram of the STESEP code and a glossary of the code symbols are given.
Author (DOE)

N79-27683# California Univ., Berkeley. Lawrence Berkeley Lab.
MODELING PASSIVE SOLAR BUILDINGS WITH HAND CALCULATIONS
David B. Goldstein 1979 9 p refs Presented at 3d Natl. Passive Solar Conf., San Jose, Calif., 11-13 Jan. 1979
(Contract W-7405-eng-48)
(LBL-8583; Conf-790108-3) Avail: NTIS HC A02/MF A01

An analytic model of passive solar building performance was derived. Heat balances were used on the surfaces of materials that absorb sunlight along with solutions to the diffusion equation, to derive response functions for surface temperature as a function of solar flux and ambient temperature. These expressions are combined to form building response functions. These explicit building response functions allow one to write relatively simple, analytic expressions for room temperature as a function of time over the course of a design day in terms of ambient temperature, sunlight, and heater output. Parallels between the analytic model and computer codes can be exploited to provide a better intuitive understanding of the programs and to assist in the incorporation of accurate passive solar simulation into these codes. DOE

N79-27684# Department of Energy, Washington, D. C.
UNDERGROUND STORAGE OF NATURAL GAS BY INTERSTATE PIPELINE COMPANIES FOR 1976 AND WINTER 1976 - 1977
T. A. Pappas Dec. 1978 45 p refs
(DOE/EIA-0151) Avail: NTIS HC A01; SOD HC

The underground natural gas fuel storage capacity, total system deliveries, and average cost of storage are reported.
M.M.M.

N79-27685# Oak Ridge Associated Universities, Tenn.
ELECTRIC UTILITIES AND SOLAR ENERGY: THE SERVICE CONTRACT IN A NEW SOCIAL CONTEXT
R. W. Gilmer and R. F. Meunier Feb. 1979 43 p refs
(Contract EY-76-C-05-0033)
(ORAU/IEA(O)-79-3) Avail: NTIS HC A03/MF A01

Proposals were advanced by both advocates and skeptics of solar energy suggesting a close merger between electric utilities and decentralized solar. It was concluded that there is a need for appropriate rate design by utilities to accommodate solar users, but that any closer merger of the two technologies is unwise. DOE

N79-27686# Department of Energy, Washington, D. C.
ENVIRONMENTAL READINESS DOCUMENT. SMALL SCALE LOW HEAD HYDRO: COMMERCIALIZATION, PHASE 3 PLANNING
Sep. 1978 32 p
(DOE/ERD-0009) Avail: NTIS HC A03/MF A01

The potential environmental, health, and safety impacts of commercialization of small scale low head hydropower technology were investigated. A relationship was found between considered commercialization scheduling and relevant environmental research and development. It was concluded that commercialization of the technology would be impeded or prevented by either adverse findings from research, mitigation costs, or delays caused by incomplete environmental information. DOE

N79-27687# Aerospace Corp., El Segundo, Calif.
SOLAR HEATING AND COOLING OF BUILDINGS (SHACOB) REQUIREMENTS DEFINITION AND IMPACT ANALYSIS Final Report
C. K. Cretcher and W. C. Melton Jun. 1978 104 p refs
(EPRI Proj. 553)
(EPRI-ER-808-Vol-1) Avail: NTIS HC A06/MF A01

The impact of solar heating and cooling systems on electric utilities was assessed and the requirements for the design of those systems were defined so that the impact was most beneficial to both the owners and the utilities. Details and results of the analysis of the change in utility demands due to solar heating and cooling of buildings. SHACOB implementation in the participating utilities' service areas are provided, along with the costs of SHACOB ownership and the economic impacts on the utilities. M.M.M.

N79-27688# Department of Energy, Washington, D. C.
SOLAR ENERGY FOR AGRICULTURAL AND INDUSTRIAL PROCESS HEAT
Sep. 1978 93 p
(DOE/CS-0053) Avail: NTIS HC A05/MF A01

Projects concerning the use of solar energy in agriculture are reported. Approximately 10 projects are included. M.M.M.

N79-27689# Black and Veatch Consulting Engineers, Kansas City, Mo.
GEOLOGIC ASSESSMENT OF COMPRESSED AIR STORAGE SITES IN KANSAS Final Report
D. Berwig Aug. 1978 68 p refs Sponsored by EPRI
(EPRI-EM-877) Avail: NTIS HC A04/MF A01

The work that was completed on the geological assessment of compressed air energy storage (CAES) in Kansas is described. The work consisted of four tasks: (1) a detailed review was

made of the power generation and transmission requirements of the Kansas Utility System; (2) based on the design and operational requirements of CAES reference plants, technical, economic, and environmental site selection criteria and a site selection procedure were established; (3) candidate sites were selected and evaluated using the economic criteria developed; and (4) a site development schedule and field investigation program were developed for an air reservoir located in salt. DOE

N79-27690# Department of Energy, Washington, D. C.
ENVIRONMENTAL READINESS DOCUMENT. SOLAR: HOT WATER AND PASSIVE, COMMERCIALIZATION PHASE 3 PLANNING
Sep. 1978 28 p
(DOE/ERD-0010) Avail: NTIS HC A03/MF A01

The characteristics of the technology was highlighted; status information was provided on the technical and environmental research and development programs; a milestone chart was presented representing a relationship between a considered commercialization schedule and relevant environmental research and development. The likelihood and consequences of adverse findings, the problems and uncertainties stemming from current or anticipated environmental regulation, and potential costs of environmental controls were discussed. On this basis, an assessment is offered of the existing or potential barriers to commercialization. A tabulation of outstanding environmental concerns is presented in an appendix. DOE

N79-27691# Oak Ridge National Lab., Tenn. Chemistry Div.
KINETICS OF SILICA DEPOSITION FROM SIMULATED GEOTHERMAL BRINES
E. G. Bohlmann, R. E. Mesmer, and P. Berlinski 1978 23 p refs Presented at the SPE Intern. Symp. on Oilfield and Geothermal Chem., Houston, Tex., 22 Jan. 1979
(Contract W-7405-eng-26)
(CONF-790108-1) Avail: NTIS HC A02/MF A01

Supersaturated brines were passed through columns packed with several forms of silica (crystalline alpha quartz, polycrystalline alpha quartz, and porous Vycor). Also silica desposition on ThO2 microspheres and titanium powder was studied under controlled conditions of supersaturation, pH, temperature and salinity. The residence time was varied by adjustments off the input effluent solutions were determined colorimetrically by a molybdate method. DOE

N79-27692# Brookhaven National Lab., Upton, N. Y.
COMPREHENSIVE AREAL MODEL OF RESIDENTIAL HEATING DEMANDS
R. G. Tessmer, Jr. 1978 8 p refs Presented at the 2d Lawrence Symp. on Systems and Decision Sci., San Francisco, 3-4 Oct. 1978
(Contract EY-76-C-02-0016)
(BNL-24998; Conf-7810139-1) Avail: NTIS HC A02/MF A01

Data sources and methodology for modeling annual residential heating demands are described. A small areal basis is chosen, census tract or minor civil divison, to permit estimation of demand densities and economic evaluation of community district heating systems. The demand model is specified for the entire nation in order to provide general applicability and to permit validation with other published fuel consumption estimates for 1970. DOE

N79-27693# Argonne National Lab., Ill. Energy and Environmental Systems Div.
PERFORMANCE OF A HYDRAULIC AIR COMPRESSOR FOR USE IN COMPRESSED AIR ENERGY STORAGE POWER SYSTEMS
J. A. Berghmans (Universite Catholique de Louvain) and F. W. Ahrens 1978 17 p refs Presented at Symp. on Fluids Eng. in Advanced Energy Conversion Systems, ASME Winter Ann. Meeting, San Francisco, 10-15 Dec. 1978
(Contract W-31-109-eng-38)
(CONF-781202-27) Avail: NTIS HC A02/MF A01

A fluid mechanical analysis of a hydraulic air compression system for Compressed Air Energy Storage application is presented. With this compression concept, air is charged into an underground reservoir, for later use in power generation, by entraining bubbles into a downward flow of water from a surface reservoir. Upon releasing the air in the underground reservoir, the water is pumped back to the surface. The analytical model delineated is used to predict the hydraulic compressor performance characteristics as a function of water flow rate and system geometrical parameters. Efficiencies as high as 90% (relative to ideal isothermal compression) can be expected. This should result in lower compression power than for conventional compressor systems, while eliminating the need for the usual intercoolers and aftercooler. DOE

N79-27694# Brookhaven National Lab., Upton, N. Y. National Center for Analysis of Energy Systems.
IMPACTS OF NEW ENERGY TECHNOLOGIES AS MEASURED AGAINST REFERENCE ENERGY SYSTEMS
Morris Beller, Andres Doernberg, Alan Hermelee, and Kenneth C. Hoffman 1979 32 p refs Presented at Conf. on Energy Alternatives, Honolulu, Hawaii, 9-12 Jan. 1979
(Contract EY-76-C-02-0016)
(BNL-25475) Avail: NTIS HC A03/MF A01

A physical description of the energy flows in the system from resources to end use, augmented with compilations of economic and environmental attributes associated with those flows, is presented. DOE

N79-27695# Brookhaven National Lab., Upton, N. Y. Policy Analysis Div.
LOCATIONAL RESPONSE TO REGULATORY POLICY: A REGIONAL ANALYSIS OF ENERGY FACILITY LOCATION
Peter M. Meier and Benjamin F. Hobbs 1978 35 p refs Presented at 1978 Ann. Meeting of the Northeast Regional Sci. Assoc., Baltimore, 12 May 1978
(Contract EY-76-C-02-0016)
(BNL-23597; Conf-7805105-2) Avail: NTIS HC A03/MF A01

The Brookhaven Regional Energy Facility Siting Model was applied to a simulation of a number of alternative regulatory strategies that affect the location of power plants. An analysis of alternative definitions of best available control technology, as called for by the 1977 Amendments to the Clean Air Act, and associated revisions of new source performance standards, are shown to have significant influence over least cost locations of coalburning power plants, with the result that despite large reductions of SO2 emissions under the more stringent emissions limitations, the locational shifts under cost minimizing behavior results in higher population exposure to SO2. The impacts of River Basin Commission policy on low flow objectives and on state regulatory policy in limiting interstate power transfers are examined. DOE

N79-27696# Argonne National Lab., Ill.
RECOVERY OF WASTED HEAT WITH CENTRALIZED AND DISTRIBUTED HEAT PUMP SYSTEMS
J. M. Calm 1978 8 p refs Presented at ASME Meeting, San Francisco, Calif., 10 Dec. 1978
(Contract W-31-109-eng-38)
(CONF-781202-32) Avail: NTIS HC A02/MF A01

Large amounts of heat are wasted in power system, industrial, and sewage treatment process. Heat pump technology coupled with thermal storage offers solutions to many of these impediments. The thermodynamics involved and the recovery potential of central and distributed heat pumps in community energy systems providing heating and air conditioning for buildings are examined. Basic system considerations are discussed and several approaches are presented to conserve scarce energy resources with such systems. DOE

N79-27697# Gibbs and Cox, Inc., Washington, D. C.
OCEAN THERMAL ENERGY CONVERSION (OTEC) PLATFORM CONFIGURATION AND INTEGRATION. VOLUME 2: CONCEPTUAL DESIGN Final Report
Jun. 1978 359 p refs
(Contract EG-77-C-01-4064)
(DOE/ET/4064-1-Vol-2) Avail: NTIS HC A16/MF A01

Hullforms were evaluated as candidates for the Ocean Thermal Energy Conversion (OTEC) commercial plant. The conceptual design including facility requirements, cost, schedule, and site sensitivity are summarized for plant configurations: the ship and the semi-submersible. Engineering drawings are presented. DOE

N79-27698# BDM Corp., Albuquerque, N. Mex.
DESIGN GUIDELINES FOR LARGE PHOTOVOLTAIC ARRAYS
R. M. Turfler, T. J. Lambarski, and R. W. Grant Jan. 1979 83 p refs
(Contract EY-76-C-04-0789)
(SAND-79-7001) Avail: NTIS HC A05/MF A01

Guidelines for protecting cells and obtaining optimum performance in the design of large photovoltaic arrays in normal and adverse illumination environments are presented. Three environments were considered: uniform illumination, selective shadowing, and illumination transients such as lightning. Only electrical considerations were addressed in these guidelines. Economic, mechanical, civil, etc., factors were not within the scope of this contract. The guidelines were keyed toward system design engineers who have a working knowledge of both electrical and mechanical design concepts. The guidelines provide a basic understanding of the design considerations and simple methods for estimating design tradeoffs in general cases. These methods can be applied to specific cases without computer simulation. DOE

N79-27699# Martin Marietta Aerospace, Denver, Colo.
A 10-KILOWATT PHOTOVOLTAIC CONCENTRATOR ARRAY
R. L. Donovan and S. Broadbent May 1978 199 p
(Contract EY-76-C-04-0789)
(SAND-78-7024) Avail: NTIS HC A09/MF A01

The design of a photovoltaic concentrator array, based on the use of an acrylic Fresnel lens to concentrate sunlight on high intensity solar cells, was optimized to obtain economical photovoltaic power generation by replacing relatively priced solar cells with low cost lenses. Major design aspects considered for optimization were the concentration ratio, size and shape of the Fresnel lens, array size and shape, structure minimization, tracking and control and the practical aspects of operation and maintenance. In addition to design of the complete array, several porotype photovoltaic concentrator module subassemblies were fabricated and delivered for evaluation. These prototypes exceed the 9.0% efficiency requirement established for this program. DOE

N79-27700# Statens Straalskyddinstitut, Stockholm (Sweden).
PRODUCTION OF HOT WATER WITH THE AID OF SOLAR ENERGY: CONDITIONS AND COSTS
Folke Peterson and Lennart Ringblom 1978 183 p refs In SWEDISH
(SIB-R-83-1978) Avail: NTIS (US Sales Only) HC A09/MF A01; DOE Depository Libraries

The conditions and the costs for the utilization of solar energy to produce hot water are discussed. Different problems connected to this production are presented. DOE

N79-27701# Health Education Authority of Louisiana, New Orleans.
GRIP-CONNECTED INTEGRATED COMMUNITY ENERGY SYSTEM. PHASE 2: DETAILED FEASIBILITY AND PRELIMINARY DESIGN, STAGE 2 Final Report
Nov. 1978 310 p Prepared in cooperation with New Orleans Public Service, Inc., La., Kidde Consultants, Inc., Belleville, N. J. and Orr-Schelen-Mayerson and Assoc., Inc., Minneapolis, Minn.
(Contract EC-77-C-02-4337)
(COO-4337-2/2) Avail: NTIS HC A14/MF A01

The plant consists of multiple fuel steam boilers, turbine generators, turbine driven chillers and necessary auxiliaries and ancillary systems. The preliminary design for these systems and for the building to house the central plant systems are presented along with equipment and instrumentation schedules and outline specifications for major components. Costs were updated to reflect revised data. The final preliminary cost estimate includes allowances for contingencies and escalation, as well as cost for the plant site and professional fees. This design is for a facility specifically with cost burning capability, recognizing that it is more capital-intensive than a gas/oil facility. The preliminary environmental assessment is included. DOE

N79-27702# United Technologies Corp., South Windsor, Conn.
ADVANCED TECHNOLOGY FUEL CELL PROGRAM Annual Report
W. E. Houghtby, J. M. King, Jr., and R. A. Thompson 1978 114 p refs
(EPRI-EM-956) Avail: NTIS HC A06/MF A01

A subscale molten carbonate cell achieved 15,370 hours endurance with stable performance through 13,000 hours. Post test analysis showed the anode structure was stable. Shutdown of the cell resulted from edge seal corrosion; an improved seal has been demonstrated through 5,000 hours of corrosion tests and 1150 hours of cell tests. Sulfur tolerance of molten carbonate cells was found to be very low; however, sulfur removal from the cell fuel gas appears to result in acceptable power plant characteristics. Testing advanced fuel processors showed that an approach referred to as adiabatic reforming has promise for achieving acceptable performance and cost while operating on distillate fuels with higher end points and sulfur levels. Laboratory tests of a regenerable scrubber for removing sulfur from gaseous processed fuel were promising. The tolerance of phosphoric acid fuel cells to sulfur in the fuel gas was investigated. DOE

N79-27703# Solar Action, Inc., Washington, D. C.
CITIZENS' SOLAR PROGRAM: STATE REPORTS ON BARRIERS AND STRATEGIES TO RENEWABLE ENERGY DEVELOPMENT
Oct. 1978 684 p
(Contract EU-78-G-01-6308)
(HCP/U6308-01) Avail: NTIS HC A99/MF A01

Solar Action, the national Sun Day organization, in an effort to focus the energy generated by Sun Day, May 3, 1978, conducted serious form where citizens and solar activists could systematically develop their analysis as to the status of solar at home and in the nation. Reports from each state grew out of this process. The 51 state solar reports provide an overview of the current status of solar power in the United States as seen through the eyes of the most ardent promoters of this emerging energy source. Financial impediments, tax complexities, hidden fuel subsidies, licensing intricacies, educational deficiencies, governmental barriers at all levels, capital shortages, and cultural biases are a few of the subject areas discussed. Ten major groups identified and discussed are educational, financial, marketing, legal, utility, regulatory, technological, policy and social barriers, and barriers due to problems within solar industry or among solar groups. Author (DOE)

N79-27704# Oak Ridge National Lab., Tenn. Energy Div.
MARKET ASSESSMENT OF FUEL CELL TOTAL ENERGY SYSTEMS Summary Report
W. R. Mixon, J. E. Christian, W. L. Jackson, G. D. Pine, H. Hagler (Resource Planning Assoc., Inc.), R. Shanker (Resource Planning Assoc., Inc.), L. Koppelman (Resource Planning Assoc., Inc.), and D. Greenstein (Resource Planning Assoc., Inc.) Mar. 1979 117 p refs
(Contract W-7405-eng-26)
(ORNL/CON-36) Avail: NTIS HC A06/MF A01

An investigation of the potential market penetration of fuel cell total energy systems (ECTES) into the nonindustrial, single building market is summarized. Input data developed for the penetration model included size distributions of each building type and performance and cost characteristics of FCTES and competing conventional systems. Two fuel cell systems, fuel cell - heat pump and fuel cell - central boiler and chiller, were assumed to compete with two conventional systems, electric heat pump and central chiller-boiler models. Two fuel cell supply situations were considered: one in which only 40 kW(e) modules were available, and one in which a catalog of 25, 40, 100, and 250 kW(e) modules were available. Data characterizing the economic climate, the intended market, and system cost and performance were used to determine the present value of life cycle costs for each system in each market segment. DOE

N79-27705# Solar Energy Research Inst., Golden, Colo.
STORAGE SYSTEMS ANALYSIS Progress Report, 1978
Robert J. Copeland Oct. 1978 21 p refs
(Contract EG-77-C-01-4042)
(SERI/PR-35-101) Avail: NTIS HC A02/MF A01

The development of thermal storage technology for solar thermal power applications was documented. The Solar Energy Research Institute's role in implementation and FY79 efforts are also described. DOE

N79-27706# BDM Corp., McLean, Va.
FEDERAL PHOTOVOLTAIC UTILIZATION PROGRAM. PLANNING RESOURCE DOCUMENT
Aug. 1978 336 p Sponsored by DOE
(HCP/M50081-01) Avail: NTIS HC A15/MF A01

The basic information required for the development of a workable and effective Federal Photovoltaic Utilization Program was provided. The current status of the technology and industry and resultant market forecast was assessed to identify current and potential Federal photovoltaic applications; develop a preliminary program plan; and assess the costs and benefits of implementing the Program. A discussion document for use in familiarizing potential participants with the scope and structure of FPUP and in soliciting their comments on and involvement in the Program is presented. DOE

N79-27707# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
POWERSAT: AN EVALUATION
Harry O. Ruppe May 1977 93 p refs
(TUM-LRT-TB-22/2) Avail: NTIS HC A05/MF A01

The Powersat concept of geostationary satellite energy generation and microwave transmission to earth was evaluated. A net power output of 10 GW per station and a space system life time 30 years were assumed. Two versions, one with rotating machinery, the other with solar cells, were considered. Three transportation methods were studied. Some other alternatives are also briefly reviewed. The rotating machinery system is preferred, as compared with solar cell systems current technology because of advantages in total weight, cost, and radiation immunity. Transport with a two stage chemical carrier to a 700 km orbit and then with electric self-propulsion is also preferred. It is concluded that energy spent will be recovered in from one to four years of operation. Other economic advantages are discussed. Author (ESA)

N79-27708# Societe Nationale Industrielle Aerospatiale, Cannes (France). Div. Systemes Balistiques et Spatiaux.
DESIGN CONCEPT AND FEASIBILITY STUDY OF A FLEXIBLE DEPLOYABLE, SOLAR PANEL GENERATOR USED ON A TELEDETECTION SATELLITE Final Report [SARSS: ETUDE DU CONCEPT ET DE LA FAISABILITE D'UN GENERATEUR A PANNEAU SOLAIRE SOUPLE DEPLIABLE POUR UN SATELLITE DE TELEDETECTION. VOLUME 1: ETUDE TECHNIQUE]
Barkats, Calvy, Cathala, Fagnoni, Giudicelli, Josse, Jourdan, Leclerc, Leguilly, Leroy et al Sep. 1978 249 p In FRENCH
(Contract ESA-3542/78-F-CG(SC))
(S-1267-CA/81-Vol-1; ESA-CR(P)-1152-Vol-1) Avail: NTIS HC A11/MF A01

The initial project concept and program for the development of 1.5 kW and 3 kW solar panels are presented. The final project objective is a twice folding 6 kW peak output solar generator to be used on a European earth observation satellite. The experience germed with the ISLA solar panel and with the space telescope is shown to be related to this project. The design of all components is discussed in detail and the planning of the successive development phases is described. Author (ESA)

N79-27709# British Aerospace Dynamics Group, Bristol (England). Electronic and Space Systems.
STUDY OF A FLEXIBLE SOLAR ARRAY GENERATOR FOR A REMOTE SENSING SATELLITE. VOLUME 1: TECHNICAL REPORT Final Report
N. B. Nye Paris ESA Oct. 1978 4162 p Original contains color illustrations 2 Vol.
(Contract ESA-3536/78-F-CG(SC))
(ESS/SS-909-Vol-1; ESA-CR(P)-1153-Vol-1) Avail: NTIS HC A08/MF A01

Feasibility of employing a roll-out solar array as the power source for a remote sensing satellite program, due for launch by Ariane in the early 1980s, was investigated. Results show that such a solar array is feasible and that design based upon the Space Telescope Solar Array meets all requirements including development timescale. Author (ESA)

N79-27710# Research Inst. of National Defence, Stockholm (Sweden).
TWO-THOUSAND AMP/HR PRIMARY LITHIUMTHIONYL-CHLORIDE CELLS: TEST RESULTS
Barbro Hallgren Nov. 1978 41 p
(FOA-C-30152-E5) Avail: NTIS HC A03/MF A01

Two lithium - thionylchloride primary 2000 amp/hr cells were tested. Both of the cells were discharged at a rate of 8 A(1mA/sq cm) to acut-off voltage of 3,0 V/cell. The experimental setup and problems encountered in handling the test materials are discussed. Results show that the discharge capacity of the cells was 97-98% of the rated capacity. However, it was observed that the internal cell pressure rose during the test period and was higher (but not critical) than predicted. Author (ESA)

N79-27711# Stuttgart Univ. (West Germany). Abt. Heizung-Lueftung-Klimatechnik.
ROOM HEAT STORAGE PROCESSES Final Report
Claus Horstmann Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 16 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-14) Avail: NTIS HC A02/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 3,15

A calculation method for the room heat storage factor, characterizing the thermal storage capacity of air conditioned rooms, is presented. The values of July and September are compared with already known factors so as to verify the proposed calculation procedure and fix boundary conditions. The heat storage factor was determined for two different types of building construction and two locations of sunblinds at 50 deg north latitude from 5 a.m. to 10 p.m. during August. Author (ESA)

N79-27712# Institut fuer Systemtechnik und Innovationsforschung, Karlsruhe (West Germany).
IDENTIFICATION OF SOCIAL AND ECONOMIC DIFFICULTIES ASSOCIATED WITH THE INTRODUCTION OF SOLAR ENERGY DEVICES Final Report
Rainer Bierhals and Guenther Schaefer Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 166 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-47) Avail: NTIS HC A08/MF A01; Fachinformationszentrum Karlsruhe, West Ger. DM 34,90

An analysis of the availability of solar radiation, the performance characteristics of solar systems, and the market potential for solar components is presented. Conclusions indicate that the potential for utilizing solar technology in the Federal Republic of Germany is considerable. The most serious difficulties are the lack of economic attractiveness for individual users, the presently low level of social acceptance of the new technology, and restrictive interpretations of zoning laws and building codes. Policy measures which are being proposed include legislative and administrative steps to eliminate zoning and building code restrictions, demonstration projects in the public and private sector to improve social acceptibility, and grant or subsidy programs to increase the economic attractiveness of the new technology. Author (ESA)

N79-27713# Lake Champlain Basin Study, Burlington, Vt.
ENERGY USE AND SUPPLY IN THE LAKE CHAMPLAIN BASIN Final Report
Jonas Barish (Federal Energy Regulatory Comm., Washington, D. C.) Oct. 1978 119 p refs
(PB-293437/0; LCBS-20) Avail: NTIS HC A06/MF A01 CSCL 10B

All available information from these overlapping jurisdictions were drawn, and projected energy demands to the year 1990, are presented. It provided a thorough discussion of the utility grid system, energy supplies, load forecasts, state and federal legislation involving energy questions, energy sources - developed and undeveloped, and environmental considerations. In addition, it recommended energy actions for the basin, including a discussion of energy alternatives. GRA

N79-27698*# Southern California Edison Co., Rosemead.
USING COAL INSIDE CALIFORNIA FOR ELECTRIC POWER
Jack B. Moore *In* JPL Proc. of Conf. on Coal Use for California 15 Aug. 1978 p 13-19 (For primary document see N79-27697 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

N79-27599*# Battelle Columbus Labs., Ohio.
USING COAL INSIDE CALIFORNIA FOR NONELECTRIC APPLICATIONS
Joseph H. Oxley *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 20-32 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

N79-27600*# Fluor Engineers and Constructors, Inc., Irvine, Calif.
A SYSTEMS EXAMINATION OF THE OPPORTUNITIES OF COAL FOR CALIFORNIA
W. M. Hathaway *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 33-36 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

N79-27601*# California Energy Commission, Sacramento. Electricity Planning Program.
ELECTRIC ENERGY DEMAND AND SUPPLY PROSPECTS FOR CALIFORNIA
H. G. Mike Jones *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 49-52 ref (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

N79-27602*# Pacific Gas and Electric Co., San Francisco, Calif.
COAL'S ROLE IN CALIFORNIA'S ENERGY NEEDS
Nolan H. Daines *In* JPL Proc. of the Conf. on Coal Use for California refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

N79-27606*# California State Dept. of Water Resources, Sacramento.
WATER AS A CONSTRAINT TO THE USE OF COAL FOR CALIFORNIA
Ronald B. Robie *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 87-89 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

N79-27611*# Ultrasystems, Inc., Irvine, Calif.
ECONOMIC CONSIDERATIONS IN COVERTING FROM OIL/GAS FIRING TO COAL
John G. Rau *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 211-216 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

N79-27612*# Southern California Edison Co., Rosemead.
DIRECT FIRING OF COAL FOR POWER PRODUCTION
L. T. Papay *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 217-224 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

N79-27613*# Pope, Evans, and Robbins, Inc., New York.
FLUIDIZED COMBUSTION OF COAL
Michael Pope *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 225-227 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10A

N79-27614*# Texaco, Inc., Montebello, Calif.
THE TEXACO COAL GASIFICATION PROCESS FOR MANUFACTURE OF MEDIUM BTU GAS
W. G. Schlinger *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 243-247 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10A

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N79-27714 Kansas State Univ., Manhattan.
THE SYNTHESIS OF ORGANIC REAGENTS FOR THE TRACE ANALYSIS OF AIR POLLUTANTS Ph.D. Thesis
Mohammed Hossain Beyad 1978 176 p
Avail: Univ. Microfilms Order No. 7915161

Several organic compounds were prepared and tested as possible reagents for the trace analysis of air pollutants. The classes of pollutants for which these reagents were made included cyanides and aldehydes, sulfur dioxide and formaldehyde, ozone, and cationic species such as H(+) and NO2(+). Dissert. Abstr.

N79-27715 North Carolina Univ. at Chapel Hill.
ACOUSTICAL PARTICLE SIZING DEVICE Ph.D. Thesis
Stephen Rohm Coover 1978 96 p
Avail: Univ. Microfilms Order No. 7914333

A novel technique of sizing aerosol particles based on an acoustical principle was developed. Passage of an aerosol particle through a special orifice produces an audible click if a critical Reynolds number is exceeded. Threshold particle size is selected by varying this Reynolds number. Spherical particles with diameters as small as 5 micrometers can be counted and sized with resolution approaching that of commercial particle size analyzers. A particle of arbitrary shape is sized on the basis of its average diameter projected perpendicular to air flow. Particle sizing is independent of particle density. Determination of counts at n Reynolds numbers can be resolved into an n point particle size spectrum. Operation of the acoustical particle sizing device is explained by classical fluid dynamics, particle physics, and accoustics. Dissert. Abstr.

N79-27716*# State Univ. of New York at Albany. Atmospheric Sciences Research Center.
A SUMMARY OF RESEARCH ON THE NASA-GLOBAL ATMOSPHERIC SAMPLING PROGRAM PERFORMED BY THE ATMOSPHERIC SCIENCES RESEARCH CENTER Final Report
Phillip D. Falconer and Robert W. Pratt Jun. 1979 59 p refs (Grant NsG-3138)
(NASA-CR-159614) Avail: NTIS HC A04/MF A01 CSCL 13B

The annual variations of ozone near the tropopause are derived from aircraft exhibit year-to-year differences which are not explicitly accounted for by the simple, classical ozone transport theory. Phenomena such as tropopause lifting, interannual variations in the rates of stratospheric-tropospheric exchange and meridional mixing, contribute differently to the distribution of ozone in this altitude region. Ozone encounter climatologies have been represented by global maps which show the probabilities of exceeding ambient ozone levels of 200, 300, and 400 ppbV along flight routes during the year. Continuous ozone records obtained from the GASP system revealed the presence of gravity waves whose wavelength is of the order 20 km. The GASP data cannot, however, be utilized for the evaluation of horizontal fluxes of such quantities as ozone, sensible heat, and zonal momentum; the data are too sparsely and irregularly distributed for the computation of stable correlations. Multiple species data from the unique circumglobal flight of a Pan American airliner on 28-30 October 1977 are discussed with particular regard to the apparent interhemispheric differences in tropospheric species concentrations, variation between the Arctic and Antarctic stratospheres, to possible covariations between species, and to potential source regions for various constituents. J.M.S.

N79-27717*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPUTER PREDICTIONS OF PHOTOCHEMICAL OXIDANT LEVELS FOR INITIAL PRECURSOR CONCENTRATIONS CHARACTERISTIC OF SOUTHEASTERN VIRGINIA
N. T. Wakelyn and Allen G. McLain Jun. 1979 33 p refs
(NASA-TM-80111) Avail: NTIS HC A03/MF A01 CSCL 13B

A computer study was performed with a photochemical box model, using a contemporary chemical mechanism and procedure, and a range of initial input pollutant concentrations thought to encompass those characteristic of the Southeastern Virginia region before a photochemical oxidant episode. The model predictions are consistent with the expectation of high summer afternoon

ozone levels when initial nonmethane hydrocarbon (NMHC) levels are in the range 0.30-0.40 ppmC and NOx levels are in the range 0.02-0.05 ppm. Calculations made with a Lagrangian model, for one of the previously calculated cases, which had produced intermediate afternoon ozone levels, suggest that urban source additions of NMHC and NOx exacerbate the photochemical oxidant condition. G.Y.

N79-27718*# Bionetics Corp., Hampton, Va.
CARBON FIBER BEHAVIOR IN AN ENCLOSED VOLUME
Mark C. Harvey Jun. 1979 27 p refs
(Contract NAS1-15238)
(NASA-CR-159076) Avail: NTIS HC A03/MF A01 CSCL 13B

Tests were performed to evaluate the behavior of single carbon fibers existing in an enclosed space such as a room of a building. Three general phenomena were explored: the concentration decay rate of a fiber-charged room, the degree of uniform mixing of fibers within a room, and the effects of fibers being redisseminated off deposition surfaces within a room. The results were required in understanding the ratio of total indoor fiber exposure to total outdoor fiber exposure, a quantity essential to risk analysis. Results indicate that decay rate is predictable within acceptable limits and that homogeneous mixing can always be assumed. Some factors of redissemination are identified and effects discussed. G.Y.

N79-27719# Teledyne Continental Motors, Mobile, Ala. Aircraft Products Div.
EXHAUST EMISSIONS CHARACTERISTICS OF 5 AIRCRAFT PISTON ENGINES Final Report, 28 Jun. 1974 - 21 Sep. 1976
Kenneth J. Stuckas Mar. 1979 327 p
(Contract DOT-FA74NA-1091)
(AD-A069012; FAA-NA-78-165; FAA-RD-78-88) Avail: NTIS HC A15/MF A01 CSCL 21/7

The development of procedures for the testing, measurement and calculation of emissions from five aircraft engines are presented as well as the determination of emissions reduction potential from lean fuel-air ratio operation and spark timing variations. Practical limitations to lean operation are investigated and confirmation of these limits were sought through a flight test program on one of the engines. M.M.M.

N79-27720# Argonne National Lab., Ill.
ENVIRONMENTAL ASSESSMENT FOR THE ELECTRIC HYBRID VEHICLE DEMONSTRATION PROJECT, PERFORMANCE STANDARDS AND FINANCIAL INCENTIVES
S. J. LaBelle 1 Oct. 1978 91 p refs
(Contract W-31-109-eng-38)
(ANL/EES/TM-22) Avail: NTIS HC A05/MF A01

The assessment is concerned with the impacts of the demonstration of electric and hybrid vehicles acquired to fulfill certain requirements of the Electric and Hybrid Vehicle Research, Development, and Demonstration Act, PL 94-413 as amended. The financial incentives programs and vehicle performance standards associated with the demonstration are also covered. Not included is an assessment of the long term effects of EHV commercialization and of the research and development program being carried out simultaneously with the demonstration also in response to PL 94-413. These federal actions will be included in a programmatic environmental assess nent scheduled for completion in FY 79. DOE

N79-27721# Scientific Translation Service, Ann Arbor, Mich.
RELATIONSHIP BETWEEN pH VALUE AND ELECTROLYTE COMPOSITION OF PRECIPITATION
D. Klockow, H. Denzinger, and G. Roenicke Oct. 1978 20 p refs Transl. into ENGLISH from "Oxygen-Containing Sulfur Compounds", Preprint VDI-314 Verein Deutsch. Ing., Duesseldorf Prepared for Argonne Natl. Lab., Ill.
(ANL-Trans-1149) Avail: NTIS HC A02/MF A01

Electric conductivity and pH values showed steady variation with time and presented a pattern of seasonal fluctuation that coincided with the fossil fuel heating season. Sulfur dioxide was implicated along with nitrogen oxides, ammonium compounds, and other metallic particulates as the cause of this global change in acidity. A radiochemical analysis was developed using Na36Cl as tracer. DOE

N79-27722# Argonne National Lab., Ill. Radiological and Environmental Research Div.
BEHAVIOR OF THE THERMAL SKIN OF COOLING POND WATERS SUBJECTED TO MODERATE WIND SPEEDS
M. L. Wesely 1978 12 p refs Presented at 2d Conf. on Waste Heat Management and Util., Miami Beach, Fla., 4-6 Dec. 1978
(Contract W-31-109-eng-38)
(CONF-781213-3) Avail: NTIS HC A02/MF A01

The temperature difference Delta Tau sub delta across the partially laminar skin of water on the surface of a water body is determined by the total heat transfer Q through the skin, the wind speed u, and the mean temperature T/sub delta of the skin. Systematic measurements of these variables were made over a wide range of conditions at a cooling pond in northeastern Illinois. Waves were present in all cases; the wind speeds were u = 2.5 to 7.0 m/1 at a height of 1 m and water temperatures were T/sub delta = 18 to 37.5C. The main result is the equation Delta Tau sub delta = 11.5 gamma/sup 2/3 kappa / sup 1/3/Qk/1 (tau/rho/sub w/)/sup-1/3/, where gamma is the water viscosity, kappa is the thermal diffusivity of water, k is the water thermal conductivity, tau is the wind shearing stress, and rho/sub w/ is the water density. DOE

N79-27723# Brookhaven National Lab., Upton, N. Y.
SULFUR AND NITROGEN COMPOUNDS IN URBAN AEROSOLS
R. L. Tanner 1979 5 p Presented at the New York Acad. of Sci. Conf. on Aerosols: Antropogenic and Natural-Sources and Transport, New York, 9-12 Jan. 1979
(Contract EY-76-C-02-0016)
(BNL-25223; Conf-790115-1) Avail: NTIS HC A02/MF A01

Aerosol sampling was done in an urban New York site, a background site at High Point, N.J., Brookhaven (Long Island) and New Haven, Connecticut. The existence of aerosol sulfate in the ambient environment predominantly in the chemical form of sulfuric acid mostly neutralized by ammonia is documented. The average composition of fine particle sulfate in summer aerosols was approximately that letovicite. Based on the impactor data, about 85% of the aerosol sulfate mass was in the fine particle fraction. About 50% of this aerosol sulfate was deduced to be in the suboptical size regime from diffusion processor data. The H(+)/SO4(-) ratio in suboptical aerosols did not significantly differ from that in fine fraction aerosol. The coarse particle sulfate was not associated with H(+) or NH4(+) and comprised about 15% of the sulfate mass. DOE

N79-27724# World Meteorological Organization, Geneva (Switzerland).
INTERNATIONAL OPERATIONS HANDBOOK FOR MEASUREMENT OF BACKGROUND ATMOSPHERIC POLLUTION
1978 120 p refs Prepared in cooperation with UN Environ. Progr. (UNEP)
(WMO-491; ISBN-92-63-10491-3) Avail: NTIS HC A06/MF A01; WMO Geneva Sw Fr 30

To provide guidance to Members establishing and operating a background air pollution monitoring program the World Meteorological Organization has prepared and published the present Operation Manual. Measurements of turbidity, sampling and analysis of precipitation, and measurement of carbon dioxide, ozone, sulphur, carbon monoxide, and other trace gases in the atmosphere are discussed. The detection and measurement of particulate matter, heavy metals and other elements as well as PCBs, pesticides and halocarbons is also referred to. Data collected is used to identify current levels of pollution and to identify long-term trends in the concentration of constituents which may affect the environment and induce climatic change. Author (ESA)

N79-27725# Centre National pour l'Exploitation des Oceans, Paris (France).
REMOTE SENSING OF HYDROCARBON POLLUTION
21 Mar. 1978 70 p Prepared in part by Inst. Francais de Petrole, Grenoble, France

Avail: NTIS HC A04/MF A01

Hydrocarbon pollution on the sea was detected and studied using airborne instruments such as a SAT scanning radiometer and a Hasselblad camera. Maps corresponding to the Amoco Cadiz disaster from March 18th to March 31st are presented. Shore line pollution and the extent of hydrocarbon water pollution can be estimated from the photographs. Thermographs are used to locate areas of hydrocarbon accumulation which are classified according to the thickness of the oil superficial layer.

Author (ESA)

N79-27726# Centre Oceanologique de Bretagne, Brest (France).
AMOCO CADIZ: PRELIMINARY OBSERVATIONS OF THE OIL SPILL IMPACT ON THE MARINE ENVIRONMENT
Gerard Conan, Laurent dOzouville, and Michel Marchand Paris Centre Natl. pour l'Exploit. des Oceans 1978 239 p refs Partly in FRENCH and ENGLISH Presented at a one day Session Amoco Cadiz, Brest, France, 7 Jun. 1978 Original contains color illustrations
(CNEXO-6-1978) Avail: NTIS HC A11/MF A01

Summaries of 19 reports referring to the Amoco Cadiz incident presented by various scientific teams working in the field during the special session of the hydrocarbon pollution international commission for the exploration of the sea held at the Oceanographic Center of Brittany are given. The chronology of remote sensing flights organized by CNEXO, IFP, and IGN is shown. An interpretation of the various data collected is given for the area of Roscoff, taken as a model. This interpretation is extended to draw a series of maps of sea and costline pollution for several days from March 18 to May 26, 1978. Two of these maps are included. Author (ESA)

N79-27727# Royal Netherlands Meteorological Inst., De Bilt.
INSOLATION MEASUREMENTS IN AND NEAR AN INDUSTRIAL REGION OF THE NETHERLANDS [DE GLOBALE STRALING IN HET RIJNMONDGEBEID]
A. J. Frantzen and W. R. Raaff 1978 35 p refs In DUTCH; ENGLISH summary
(KNMI-WR-78-14) Avail: NTIS HC A03/MF A01

Differences in insolation within the industrial region of the Nieuwe Waterweg west of Rotterdam in the Netherlands were investigated by comparing solar radiation measurements made at twelve stations during a three year period. The central part of the area, in particular Rotterdam and its surroundings, received less solar radiation than the outskirts during the period considered; the deficit was 8 to 10%. In order to show that the deficit is due to increased attenuation by polluted air, the hourly sums of overall clear sky radiation were considered relative to those obtained at Greup, a station situated at the fringe of the area, distinguishing between seasons and wind direction. In summer a maximum difference of 11% in solar radiation was observed across the area; in winter the deficit amounted to 19%. Assuming an accuracy of 5% in the radiation measurements, the differences in insolation are taken to be real and attributable to a difference in turbidity in the boundary layer over the area considered.

Author (ESA)

N79-27728# Royal Netherlands Meteorological Inst., De Bilt.
ESTIMATING AIR POLLUTION FREQUENCY DISTRIBUTIONS [OVER DE SCHATTING VAN FREQUENTIEVERDELINGENEN LUCHTVERONTREINIGING]
G. J. Cats 1978 33 p refs In DUTCH; ENGLISH summary
(KNMI-WR-78-16) Avail: NTIS HC A03/MF A01

An empirical method for obtaining air pollution frequency distributions from long-term average concentrations is described. The method was verified in the Rijnmond area and two other industrial/urban areas in the Netherlands. With the aid of the given graphs the method can be applied using only a pocket calculator if long-term average concentrations are known. Some examples illustrate the application of the method. Author (ESA)

N79-27729# AEG-Telefunken, Frankfurt am Main (West Germany).
ELECTROCHEMICAL APPARATUS FOR ANALYZING CARBON MONOXIDE, HYDROGEN SULFIDE, HYDROGEN AND SULFUR DIOXIDE Final Report
Harald Boehm Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 18 p In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-T-78-08) Avail: NTIS HC A02/MF A01; Fachinformationzentrum Karlsruhe, West. Ger. DM 4,00

An electrochemical measuring process for analyzing the air pollutants SO2, NO2, NO, and unsaturated hydrocarbons was developed. The gas diffusion sensing electrodes produced with electrocatalysts are described. A measuring cell was built and the conditions of operation were determined. For demonstrating the measuring process a portable monitor was designed to detect selectively, individual atmospheric pollutants. Author (ESA)

N79-27730# Environmental Monitoring and Support Lab., Las Vegas, Nev.
ENERGY-RELATED AIR QUALITY MONITORING IN THE WESTERN ENERGY RESOURCE DEVELOPMENT AREA
M. L. Pitchford, R. N. Snelling, J. Bowen, M. Pearson, and D. N. McNelis Nov. 1978 62 p refs
(PB-293160/8; EPA-600/7-78-227) Avail: NTIS HC A04/MF A01 CSCL 13B

A program designed to create an environmental data base for assessing the air quality impact of energy development in an eight state region (Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, Wyoming) is described. The program was developed to use and augment existing monitoring activities as well as create new monitoring systems. GRA

N79-27544# Flow Research, Inc., Kent, Wash.
PHYSICAL MODELING OF PLUME DISPERSION IN COMPLEX TERRAIN: NEUTRAL AND STABLE ATMOSPHERE
H. T. Liu and J. T. Lin *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 3-15 refs (For primary document see N79-27543 18-42)
(Contracts EPA-68-02-1293; EPA-68-02-1294)
Avail: NTIS HC A99/MF A01

N79-27545# North American Weather Consultants, Goleta, Calif.
VALLEY CIRCULATION INFLUENCE ON TALL STACK DISPERSION FROM A RIDGE LOCATION
Einar L. Hovind, Timothy C. Spangler, Nicholas E. Graham, and Peter G. Sagert (British Columbia Hydro and Power Authority) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 17-26 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27546# North American Weather Consultants, Goleta, Calif.
A METHOD OF COMPUTING MAXIMUM GROUND-LEVEL CONCENTRATIONS OF SO2 UNDER PROLONGED STAGNATION CONDITIONS
Einar L. Hovind, Max W. Edelstein, and Darryl G. Paulson *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 27-35 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27547# Warren Spring Lab., Stevenage (England).
DISPERSION FROM CHIMNEYS DOWNWIND OF CUBICAL BUILDINGS: A WIND-TUNNEL STUDY
C. F. Barrett, D. J. Hall, and A. C. Simmonds *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 37-44 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27548# Calgary Univ. (Alberta). Dept. of Chemical Engineering.
FIELD INVESTIGATIONS OF THE DISPERSION OF POLLUTION ACROSS A RIDGE
S. F. Benjamin, J. J. Havlena, and R. D. Rowe *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 45-54 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27549# Atmospheric Environment Service, Downsview (Ontario).
MODELLING THE EFFECT OF SEPARATED WAKES BEHIND HILLS AND BUILDINGS ON POLLUTANT DISPERSION
J. S. Puttock *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 55-67 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27562*# Martin Marietta Corp., Baltimore, Md. Environmental Center.
STACK PLUME CHARACTERIZATION AND MODEL ASSESSMENT WITH LIDAR DATA
Jeffrey C. Weil and Jonathan L. Altman *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 197-207 refs Sponsored by NASA (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27565# Ente Nazional per l'Energia Elettrica, Milan (Italy).
RESULTS OF SF6 TRACER DIFFUSION EXPERIMENTS NEXT TO A POWER PLANT
P. Bacci, A. Longhetto, F. Bossa (TGT, Milan), P. Gaglione (Joint Research Centre of the European Communities), and G. Bonino (CNR, Turin) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 241-249 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27567# Ontario Ministry of the Environment, Toronto.
SHORT-TERM DISPERSION FROM TALL STACKS
A. Venkatram and J. Kurtz *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 271-280 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27568# Systems Applications, Inc., San Rafael, Calif.
AN IMPROVED VERSION OF THE REACTIVE PLUME MODEL (RPM-II)
Mei-Kao Liu, Douglas A. Stewart, and Philip M. Roth *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 281-290 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27572# Risoe National Lab., Roskilde (Denmark).
REPRESENTATION OF INTER GRID SOURCES IN PSEUDO-SPECTRAL DISPERSION MODELS
Ruwim Berkowicz (Danish Meteorological Inst., Copenhagen) and Lars P. Prahm *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 323-332 refs Submitted for publication (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27573# Form and Substance, Inc., Westlake Village, Calif.
VERIFICATION OF THE MADCAP MODEL OF PHOTOCHEMICAL AIR POLLUTION IN THE SAN DIEGO AIR BASIN
Ralph C. Sklarew *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 333-342 (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27574# Form and Substance, Inc., Westlake Village, Calif.
POINT SOURCE AIR POLLUTION MODELING
Ralph C. Sklarew *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 343-352 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27576# SRI International Corp., Menlo Park, Calif.
THE EUROPEAN REGIONAL MODEL OF AIR POLLUTION (EURMAP) AND ITS APPLICATION TO SHORT TERM EPISODES
W. B. Johnson, C. M. Bhumralkar, R. L. Mancuso, and D. E. Wolf *In* NATO Comm. on the Challgenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 363-385 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27578# Teknekron, Inc., Berkeley, Calif.
A MULTI-SCALE DISPERSION MODEL FOR LOCAL AND REGIONAL SULFUR DIOXIDE/SULFATE CONCENTRATIONS: FORMULATION AND INITIAL EVALUATION
Michael T. Mills and Allan A. Hirata *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 397-406 refs (For primary document see N79-27543 18-42)
(Contract EPA-68-01-1921)
Avail: NTIS HC A99/MF A01

N79-27579# Teknekron, Inc., Waltham, Mass.
COMPILATION AND ANALYSIS OF DATA SETS FOR THE EVALUATION OF REGIONAL SULFATE MODELS
Eugene Y. Tong and Robert B. Batchelder *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 407-416 refs Prepared in cooperation with Boston Univ., Mass. (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27580# Toronto Univ. (Ontario). Inst. for Environmental Studies.
THE DESIGN OF AIR QUALITY NETWORKS
R. E. Munn *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 417-427 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27581# Waterloo Univ. (Ontario).
A PLUME DISPERSION STUDY AT MILDRED LAKE, ALBERTA
G. A. Davidson, P. R. Slawson, and S. G. Djurfors *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 441-454 refs Prepared in cooperation with Syncrude Canada Ltd., Edmonton (Alberta) (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27582# Environmental Protection Agency, Chicago, Ill.
THE RATIO OF PEAK 1-HOUR AVERAGE CONCENTRATIONS TO PEAK CONCENTRATIONS OF OTHER AVERAGING TIMES FOR VARIOUS POLLUTANTS AND DIFFERING SOURCES
Dennis A. Trout *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 455-464 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27583# Du Pont de Nemours (E. I.) and Co., Wilmington, Del.
VALIDATION OF CRSTER MODEL AIR QUALITY ESTIMATES FOR AN INDUSTRIAL PLANT
Robert I. Wevodau, Jr. *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 465-474 (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27586# British Leyland Motor Corp., Allesley (England).
THE APPLICATION OF A MATHEMATICAL MODEL TO THE ESTIMATION OF THE CONCENTRATIONS OF POLLUTANTS IN EUROPEAN CITIES
John H. Weaving, Stephen F. Benjamin, Paolo P. Gaddo, and

Francesco Repetto *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 499-510 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27587# FEEMAS (Italy).
MATHEMATICAL MICROMODEL FOR LOCAL DIFFUSION OF CARBON MONOXIDE FROM MOTOR VEHICLES
P. P. Gaddo, F. Corazzari, L. Giacomelli, A. Moscatelli, M. Fontana, and D. Ferrante *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 511-520 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27588# Beak Consultants Ltd., Toronto (Ontario).
STABILITY SENSITIVITY OF THE CLIMATOLOGICAL DISPERSION MODEL: A PRACTICAL EXAMINATION
James W. S. Young *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 521-525 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27589# Systems Applications, Inc., San Rafael, Calif.
A CONSIDERATION OF MEASURES AND STANDARDS OF PERFORMANCE OF AIR QUALITY SIMULATION MODELS
S. R. Hayes *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 527-537 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27590# ETA Engineering, Inc., Westmont, Ill.
AIR MONITORING NETWORK DESIGN FOR POWER PLANT SITING
Roger K. Raufer, Jay E. Norco, Terry D. Worrell, Richard A. Braun, Joseph E. Marks, and Kenneth E. Noll *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 547-556 refs Prepared in cooperation with Commonwealth Edison Co., Chicago and Illinois Inst. of Tech., Chicago (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27594# Hokkaido Univ., Sapporo (Japan).
ON A CALENDAR-TIME ORIENTED SYSTEMATIC SAMPLING PLAN IN AIR QUALITY MONITORING
Rikita Inouye *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 603-609 ref (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27595# Laboratorio Provinciale Igiene e Profilassi, Milan (Italy).
VALIDATION OF THE SO2 EMISSION INVENTORY FOR THE MILAN DISTRICT AREA (50 X 60 km)
R. Gualdi, G. Tebaldi, and P. Lega (Osservatorio Meteorol. di Brera, Milan, Italy) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 611-620 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27604*# Sierra Club, Washington, D.C. Southern California Energy Committee Chair.
POSSIBLE ENVIRONMENTAL EFFECTS OF INCREASED COAL USE IN CALIFORNIA
Dwight L. Carey *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 73-75 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13B

N79-27605*# California Space Shuttle Task Force.
AIR QUALITY AS A CONSTRAINT TO THE USE OF COAL IN CALIFORNIA
Thomas C. Austin *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 76-86 refs (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13B

N79-27609*# Electric Power Research Inst., Palo Alto, Calif.
STATUS OF NO SUB X CONTROL FOR COAL-FIRED POWER PLANTS
D. P. Teixeira *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 171-180 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13B

N79-27610*# Teknekron, Inc., Berkeley, Calif.
ECONOMIC COMPARISON OF FABRIC FILTERS AND ELECTROSTATIC PRECIPITATORS FOR PARTICULATE CONTROL ON COAL-FIRED UTILITY BOILERS
Peter M. Cukor and Richard A. Chapman *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 183-194 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 13B

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N79-27731 Colorado State Univ., Fort Collins.
A DETAILED PARAMETERIZATION OF THE ATMOSPHERIC BOUNDARY LAYER Ph.D. Thesis
Peter John Wetzel 1978 206 p
Avail: Univ. Microfilms Order No. 7913844

A one dimensional parameterized model of the planetary boundary layer (PBL) was developed and tested. The model predicts layer averaged values of wind, temperature and moisture under both stable and unstable conditions by assuming standard profile shapes. The model was tested and compared with other models of the PBL. Results show that the model simulated the observations well, and that it was equal or superior to the other models examined. Sensitivity tests and exploratory tests of the model were performed. In these it was shown that the PBL is very sensitive to changes in parameters such as the mass of the layer of the surface, the difference between the characteristic heights for moisture and momentum, the amount of dew present at dawn, and the soil moisture content. Dissert. Abstr.

N79-27732 Ohio State Univ., Columbus.
THE 911 YEARS OF MICROPARTICLE DEPOSITION AT THE SOUTH POLE: A CLIMATIC INTERPRETATION Ph.D. Thesis
Ellen Mosley Thompson 1979 218 p
Avail: Univ. Microfilms Order No. 7916035

A detailed analysis of the particles within a 101-meter firn core from A nundsen-Scott South Pole Station was performed. The temporal variations in the concentration, size distribution and elemental constituents of the particles deposited within firn and ice cores provided a record of the characteristics of the atmospheric particulate mass which is not available from any other source. A total of 6218 samples were analyzed for particle concentration and size distribution. Individual particles within selected sections of the core were examined for morphology and elemental constituents using a scanning electron microscope and an X-ray energy dispersive system. The annual cycle in particle concentration was employed to construct a 911-year time scale for the 101-meter core. Dissert. Abstr.

N79-27733 Rhode Island Univ., Kingston.
A STUDY OF THE THEORETICAL AND PRACTICAL DETERMINATION OF HYDROGEOLOGICAL PARAMETERS IN GLACIAL OUTWASH SANDS BY SURFACE GEOELECTRICS Ph.D. Thesis
Daniel Wayne Urish 1978 336 p
Avail: Univ. Microfilms Order No. 7915473

The most productive aquifers of New England are glacial

outwash deposits which frequently lie hidden in buried preglacial valleys. Because of the great heterogeneity of glacial deposits the usual methods for locating potentially good aquifer material by interpolation from boreholes is frequently inadequate. Good empirical correlations between electrical resistivity and hydrogeological parameters of aquifers were reported. These findings, however, are not supported by theory and do not relate well to laboratory data on resistivity-permeability relationships. A sound basis for the resistivity permeability relationship is presented and differences between the theoretical concepts and empirical observations are explained. Dissert. Abstr.

N79-27734 California Univ., Berkeley.
WAVE PROPAGATION IN ANELASTIC MEDIA WITH APPLICATIONS TO SEISMOLOGY Ph.D. Thesis
Walter Joseph Silva, Jr. 1978 164 p
Avail: Univ. Microfilms Order No. 7914763

A formulation is presented which incorporates linear anelastic attenuation into plane layer models in an exact manner. Several examples of body wave propagation in absorbing media are presented. Surface time histories are compared between predicted acceleration records using the plane-layered model and data recorded by a vertical array. Spectral ratios between the surface and bedrock, computed for the horizontal components, show fair agreement with the model predictions. In particular, the importance of attenuation in predicting ground motion in soils is demonstrated. It is further shown that converted waves are of minor importance while lateral propagation can be significant. The formulation is extended to both Love and Rayleigh wave propagation. Dissert. Abstr.

N79-27735 Stanford Univ., Calif.
STRIKE-SLIP FAULTING: MODELS FOR DEFORMATION IN A NON-UNIFORM CRUST Ph.D. Thesis
Kenneth David Mahrer 1979 200 p
Avail: Univ. Microfilms Order No. 7912387

The theoretical study of crustal deformation associated with earthquakes, fault creep and tectonic stress, in general, readily divides into two generic branches: dynamic and static modeling. In static or DC fault slip plus crustal material properties are assumed in order to synthesize static or quasi-static deformation data. This theoretical data is then used to interpret actual surface deformation measurements. The models were derived to include recent laboratory and field data by incorporating more realistic rigidity variations in the crust. Three general classes of models were developed. Each assumes linear elasticity and two-dimensionality. The first two models are for vertical strike-slip faults and vary the rigidity of the crust on the gross scale, first vertically and then horizontally. The third model departs from this scale and varies the rigidity on the local scale.
Dissert. Abstr.

N79-27736 Rochester Univ., N. Y.
THE EFFECT OF A MOVING LITHOSPHERIC PLATE ON CONVECTION IN THE EARTH'S MANTLE Ph.D. Thesis
Richard Alan Lux 1979 96 p
Avail: Univ. Microfilms Order No. 7914479

The coupling between a rigidly-moving lithospheric plate and a convecting mantle was investigated using a simple two-dimensional numerical model. The model incorporates a fluid layer heated from below or heated internally and acted upon by a horizontally-moving upper boundary, simulating the effect of a moving plate. For both heating from below and internal heating, the moving boundary strongly controls the horizontal length scale of convection cells when the boundary velocity is greater than the free convective velocity (i.e., the velocity of convection under a stationary boundary). Results indicate that mantle convection and lithospheric plate motions are strongly coupled. The rigidly-moving plates strongly control the flow structure in the mantle. Single cells are likely under the faster plates, with the mantle convection cells possibly exerting large driving forces on the plates. Dissert. Abstr.

N79-27737 California Univ., Berkeley.
STUDIES IN MODELING, REDUCTION AND FILTERING OF POTENTIAL FIELD DATA Ph.D. Thesis
Kwok Chun Chan 1978 84 p
Avail: Univ. Microfilms Order No. 7914562

A method of computing gravity and magnetic anomalies due to inhomogeneous distribution of magnetization and density is presented. Analytic expressions in the form of a convolution of two functions were derived for the potential field anomalies. The problem of reduction of potential field data, when observed on an arbitrary surface in a region of high topographic relief, is studied with the concept of equivalent source representation. A new method for minimization of terrain-induced anomalies on a magnetic or gravity map is suggested. The concept of separable filtering in the processing of potential field data is introduced. A new algorithm based on the method of separable filtering is proposed to calculate efficiently the magnetic anomalies due to an arbitrarily shaped body with inhomogeneous magnetization.
Dissert. Abstr.

N79-27738 North Carolina Univ. at Chapel Hill.
THE SALTVILLE THRUST DECOLLEMENT: DEFORMATION OF MACCRADY FORMATION EVAPORITES Ph.D. Thesis
Nopadon Muangnoicharogen 1978 128 p
Avail: Univ. Microfilms Order No. 7914390

A study of the deformation mechanism was done on gypsum and anhydrite specimens from the Maccrady Formation of Mississippian age in the Locust Cover syncline. The strain behavior of anhydrite is a combination of intercrystalline slip and intracrystalline translation gliding, while gypsum deforms by a combination of intracrystalline translation gliding and recrystallization in a nonhydrostatic stress state. Preferred orientation of the crystallographic lattice of both minerals and inferred directions of the maximum compressive stress for small scale domains of hand specimen size were compared to the mesoscopic controlling folds to illustrate the radial distribution of the maximum compressive stress out of the core of folds. Dissert. Abstr.

N79-27739 Tulsa Univ., Okla.
SEISMIC STRATIGRAPHY AND BASIN DEVELOPMENT, NESTOS DELTA AREA, NORTHEASTERN GREECE Ph.D. Thesis
Dimitrios Kousparis 1979 193 p refs
Avail: Univ. Microfilms Order No. 7915892

The structural framework of the basin was investigated in terms of modern tectonic concepts using seismic, well control and gravity data. Three synthetic seismograms were generated from sonic and density logs in order to transfer well information to seismic profiles. Based on the synthetic seismograms, seismic profiles and interval velocities, the top of the metamorphic basement was defined. A structural map for the top of the basement was constructed using two way travel time. The same boundary in the Prinos graben was mapped with a 100 m contour interval. Deposition of the upper three seismic sequences was controlled by relative sea level changes indicated by reflection boundaries of sequences and by basin subsidence due to sedimentation. Deposition of the three units of seismic sequence 1 was mainly controlled by intense tectonic activity, and sea level changes. Dissert. Abstr.

N79-27740 Illinois Univ. at Urbana-Champaign.
OXYGEN AND HYDROGEN ISOTOPIC FRACTIONATION FACTORS DETERMINED IN EXPERIMENTAL CLAY-WATER SYSTEMS Ph.D. Thesis
Jean Bryna Kulla 1979 106 p
Avail: Univ. Microfilms Order No. 7915378

The hydrogen and oxygen isotopic fractionation factors were determined in several clay-water systems by hydrothermal synthesis. Kaolinite, montmorillonite and saponite approached isotopic equilibrium to greater than 90% in most cases. Equilibrium hydrogen isotope fractionation factors for kaolinite, montmorillonite and saponite water systems were found to have a complicated temperature dependence. The equilibrium fractionation factor varies little with temperature below 100 C. At temperatures above 220 C for saponite and 270 C for kaolinite and Al-montmorillonite, the equilibrium fractionation factor is apparently independent of temperature. Dissert. Abstr.

N79-27741 California Univ., Berkeley.
CHEMICAL INTERACTION OF AQUEOUS SOLUTIONS WITH EPIDOTE-FELDSPAR MINERAL ASSEMBLAGES IN GEOLOGIC SYSTEMS Ph.D. Thesis
Dennis Keith Bird 1978 134 p

Avail: Univ. Microfilms Order No. 7914545

Simultaneous consideration of Mossbauer and/or experimental phase equilibrium data for epidote, andradite, and hedenbergite together with the thermodynamic properties of aqueous species, CO2 - H2O fluids, and coexisting minerals permits comprehensive analysis of mineral stabilities and the effects of preferential site occupancy and solid solubility on hydrothermal solution compositions in the system CaO-FeO-Fe2O3-Al2O3-SiO2-H2O-CO2 at high pressures and temperatures. Thermodynamic analysis of compatibilities and compositions of aqueous solutions and minerals in the system Na2O-K2O-CaO-FeO-Fe2O3-Al2O3-SiO2-H2O-CO2 at pressures and temperatures to 5 kb and 600 C permits quantitative description and interpretation of phase relations among epidote, plagioclase, alkali feldspar and hydrothermal solutions in metamorphic/geothermal systems.

Dissert. Abstr.

N79-27742 California Univ., Berkeley.

REFERENCED MAGNETOTELLURICS WITH SQUIDS Ph.D. Thesis

Thomas Dean Gamble 1978 136 p

Avail: Univ. Microfilms Order No. 7914609

The measurement of the relationship between the natural fluctuations of the earth's magnetic field and the voltages they produce in the surface of the earth is discussed. This relationship is approximately defined by the electromagnetic impedance of the surface of the earth for normally incident plane waves. Measurements of the impedance were used as a method of geophysical survey called magnetotellurics. Because the electrical resistivities of different types of ground differ by several orders of magnitude this method has met with moderate success in spite of the fact that the estimates of the impedance were not very precisely reproducible. The design, construction and operation of a 3 axis dc SQUID magnetometer suitable for field measurements are described.

Dissert. Abstr.

N79-27743*# California Inst. of Tech., Pasadena. Radiation Lab.

GRAVITATIONAL RADIATION AND THE ULTIMATE SPEED IN ROSEN'S BIMETRIC THEORY OF GRAVITY

Carlton M. Caves [1979] 35 p refs

(Grants NGR-05-002-256; NSF AST-76-80801-A-02)

(NASA-CR-158718) Avail: NTIS HC A03/MF A01 CSCL 08N

Emission of gravitational radiation was shown to prevent particles of nonzero rest mass from exceeding the speed of gravitational radiation.

R.E.S.

N79-27744*# Pennsylvania State Univ., University Park. Ionosphere Research Lab.

IONOSPHERIC RESEARCH Semiannual Status Report, 1 Oct. 1978 - 31 Mar. 1979

31 Mar. 1979 43 p refs

(Grant NGL-39-009-003)

(NASA-CR-158762; PSU-IRL-SAR-79/1; SASR-1) Avail: NTIS HC A03/MF A01 CSCL 04A

Projects currently in progress on ionospheric research are described. General topics discussed include: planetary atmospheres, the ionosphere and its region, and mass spectroscopy.

R.E.S.

N79-27745# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

COMMENTS ON THE PAPER ENTITLED THE QUENCHING OF OH* IN THE ATMOSPHERE BY LLEWELLYN, LONG AND SOLHEIM

H. Takahashi and P. P. Batista May 1979 8 p refs Submitted for publication

(INPE-1484-RPE/030) Avail: NTIS HC A02/MF A01

Results and conclusions of the paper by Llewellyn et al. (1978) are compared with airglow data. The experimental observations do not support the very high vibrational relaxation rates determined by Llewllyn et al. It appears that chemical quenching by atomic oxygen must be significant, and that the H-O3 process alone for the OH* production cannot account for the observed intensity ratios.

Author

N79-27746# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

CENTRAL PLANE OF THE RING CURRENT RESPONSIBLE FOR GEOMAGNETIC DISTURBANCE IN THE SOUTH AMERICAN REGION

R. P. Kane and N. B. Trivedi May 1979 32 p refs Submitted for publication

(INPE-1482-RPE/029) Avail: NTIS HC A03/MF A01

Using hourly values of H, D, Z from a network of South American stations, operative during the IGY-IGC, the latitude dependence of storm effects was studied. It was found that whereas there were considerable distortions due to conductivity anomalies under the Andes, there was also evidence of latitudinal excursions of overhead current system, not only from storm to storm but even during the course of the same storm.

Author

N79-27747# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

INFLUENCE OF NORTHERN AND SOUTHERN HEMISPHERE Sq CURRENT SYSTEMS ON THE EQUATORIAL REGION

Rajaram P. Kane and N. B. Trivedi Mar. 1979 9 p refs

(INPE-1434-RPE/010) Avail: NTIS HC A02/MF A01

The H and D variations at Huancayo (75 degrees W) and Ribeirao (49 degrees W), both located at the dip equator in the South America region, were compared with those at nearby midlatitude locations, Tatuoca in the north and Vassouras in the south, for the six day interval September 17-22, 1970. It was noticed that whereas Huancayo was under the influence of the S sub q current system of the southern hemisphere, Ribeirao was under the influence of the S sub q current system of the northern hemisphere, indicating a very twisted equatorial boundary between the two S sub q current systems in this region.

Author

N79-27748*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

TECTONIC MOTION SITE SURVEY OF THE NATIONAL RADIO ASTRONOMY OBSERVATORY, GREEN BANK, WEST VIRGINIA

W. J. Webster, Jr., R. J. Allenby, L. K. Hutton, P. D. Lowman, Jr., and H. A. Tiedemann Jun. 1979 23 p refs

(NASA-TM-79691) Avail: NTIS HC A02/MF A01 CSCL 08F

A geological and geophysical site survey was made of the area around the National Radio Astronomy Observatory (NRAO) to determine whether there are at present local tectonic movements that could introduce significant errors to Very Long Baseline Interferometry (VLBI) geodetic measurements. The site survey consisted of a literature search, photogeologic mapping with Landsat and Skylab photographs, a field reconnaissance, and installation of a seismometer at the NRAO. It is concluded that local tectonic movement will not contribute significantly to VLBI errors. It is recommended that similar site surveys be made of all locations used for VLBI or laser ranging.

G.Y.

N79-27749# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

ESTIMATION OF THE GEOPOTENTIAL COEFFICIENTS [REAVALIACAO DOS COEFICIENTES DO GEOPOTENCIAL]

Wilson Custodio C. daSilva, Hans-Ulrich Pilchowski, and Luiz Danilo D. Ferreira Mar. 1979 23 p refs In PORTUGUESE; ENGLISH summary

(INPE-1427-RPE/006) Avail: NTIS HC A02/MF A01

The expression of geopotential in spherical harmonics (potential of Terrestrial Gravitational field) has two coefficients, C sub 21 and S sub 21, which were taken as zero in theory. However, satellite measurements determined that C sub 21 as well as S sub 21 are nonzero, showing that the axis of earth rotation is not the principal axes of inertia. The angles which the principal axes of inertia rotate in relation to the geocentric coordinate system were determined. The error due to using C sub 21 = S sub 21 = 0, and the effect of such error on the other coefficients of the geopotential were calculated.

G.Y.

N79-27750# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.

RESPONSE CHARACTERISTICS OF KNOLLENBERG LIGHT-SCATTERING AEROSOL COUNTERS
R. G. Pinnick and H. J. Auvermann Feb. 1979 57 p refs
(DA Proj. 1T1-61101-A-91A)
(AD-A067701; ERADCOM/ASL-TR-0025) Avail: NTIS HC A04/MF A01 CSCL 04/1

Response calculations are presented for four commercially available Knollenberg light-scattering aerosol counters: the classical scattering aerosol spectrometer probe (CSASP), the active scattering aerosol spectrometer probe (ASASP), the forward scattering spectrometer probe (FSSP), and the axially scattering spectrometer probe (ASSP). These instruments are widely used in the Department of Defense for measurement of fog, haze, dust, smoke, and battlefield-debris aerosols, in many cases without adequate understanding of their response characteristics and limitations. The results presented here show sensitivity of the response to aerosol refractive index for values of indexes characteristic of atmospheric aerosols, and for a particular index, multivalued response for particles in the 0.5 micrometers to 4 micrometers radius range. The response calculations have been validated for two of these instruments (the CSASP and ASASP) by measurement of monodisperse spherical particles. The size resolution of these two instruments is significantly less than advertised by the manufacturer and measurement of irregular particles causes additional loss of resolution. Author (GRA)

N79-27751# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL SYSTEM TO MEASURE ATMOSPHERIC EXTINCTION OF VISIBLE, NEAR AND FAR INFRARED RADIATION IN THE MARINE BOUNDARY LAYER M.S. Thesis
James R. MacDonald Dec. 1978 54 p refs
(AD-A067557) Avail: NTIS HC A04/MF A01 CSCL 04/1

A method of measuring atmospheric extinction of radiation along a 13.3 kilometer path in the marine boundary layer has been devised and demonstrated. The design allows for selective measurement of extinction from the visible to the far infrared wavelengths. Two greybody sources, one covering the visible and near infrared and the other covering all bands out to the far infrared were each mounted on reflecting telescopes which were used to project the radiation. A reflecting telescope with selectable detectors was employed as the receiver. Two feasibility trials were conducted and the equipment was successfully calibrated. Author (GRA)

N79-27752# Air Force Geophysics Lab., Hanscom AFB, Mass.
AN INTRODUCTION TO THE AFGL MAGNETOMETER NETWORK
David J. Knecht, Robert O. Hutchinson, and Charles W. Tsacoyeanes Apr. 1979 23 p refs
(AD-A068979; AFGL-TR-79-0108) Avail: NTIS HC A02/MF A01 CSCL 08/14

The seven-station magnetometer network of the Air Force Geophysics Laboratory is currently in continuous operation. Five data-collection stations (Newport, WA, Rapid City, SD, Camp Douglas, WI, Mount Clemens, MI, and Sudbury, MA) form a 3800-km east-west chain at 55 degrees N corrected geomagnetic latitude. Two others (Lompoc, CA, and Tampa, FL) are separated by 3800 km at 40 degrees N corrected geomagnetic latitude. The principal instruments, identical at all stations, include a three-component induction-coil magnetometer to measure its time derivative. Sensitivities are about 0.1 gamma and 0.001 gamma-Hz, and sampling frequencies are one and five samples per second, respectively. The data-collection stations are not manned; measurements are made and processed automatically by microprocessor-based equipment at each station. Stations are synchronized and controlled remotely from the data-acquisition station at AFGL in Massachusetts. Outbound control and inbound data-return signals are transmitted on dedicated commercial voice-grade phone lines. Forward-error-correction techniques are used to assure accurate data transmissions. Operation is fulltime and continuous except for interruptions occasioned by malfunctions of the equipment or communications circuits. Data from all seven stations are processed and archived in near-real time by a dedicated minicomputer; values of the field and its time derivative are available within twenty seconds of the sampling time. Examples of the output data are presented. GRA

N79-27753# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
INVESTIGATION OF NEAR SURFACE AEROSOL PROPERTIES IN ARID REGIONS Final Report, Jan. 1978 - Jan. 1979
J. M. Rosen and D. J. Hofmann Aug. 1978 36 p refs
(Grant DAAG29-78-G-0048)
(AD-A068554; AP-45; ARO-15119.1-GS) Avail: NTIS Avail: NTIS HC A03/MF A01 CSCL 04/1

During the first two weeks of April, 1978, tethered balloon soundings were conducted at White Sands Missile Range. Vertical profiles of aerosol concentration, temperature and wind speed were obtained. The results show very little change in aerosol concentration with altitude suggesting that a measurement at 5 or 6 meters above the surface would provide concentrations typical of at least the first 700 meters. GRA

N79-27754# Naval Research Lab., Washington, D. C.
ON THE GENERATION OF 3 METER IRREGULARITIES DURING EQUATORIAL SPREAD F BY LOW FREQUENCY DRIFT WAVES Interim Report
J. D. Huba and S. L. Ossakow 20 Apr. 1979 24 p refs
(AD-A068580; NRL-3977) Avail: NTIS HC A02/MF A01 CSCL 20/14

We consider the linear theory of low frequency drift waves for parameters typical of the ionosphere during equatorial Spread F. These waves are considered to be generated by density gradients associated with long wavelength primary plasma fluid instabilities (e.g., collisional Rayleigh-Taylor). We include electron-ion, electron-neutral and ion-ion collisions in our analysis. We find that a collisional drift wave can occur in the 3 meter regime but that it is heavily damped by ion viscosity. For density gradient scale lengths aprox. greater than 75m, it is required that $n = 1/2000$ cc for wave excitation to occur. GRA

N79-27755# California Univ., Berkeley. Dept. of Civil Engineering.
EVALUATION OF THREE CONSTITUTIVE MODELS FOR SOILS Final Report
Patrick C. Lucia and James M. Duncan Mar. 1979 100 p refs
(Contract DACW39-78-M-2077)
(AD-A068222; UCB/GT-78-05; WES-MPGL-79-3) Avail: NTIS HC A05/MF A01 CSCL 08/13

The finite element method provides a powerful technique for analysis of stresses and movements in earth masses, and it has already been applied to a number of practical problems including embankment dams, open excavations, braced excavations, and a variety of soil-structure interaction problems. If the results of soil deformation analyses are to be realistic and meaningful, it is important that the stress-strain characteristics of the soil be represented in the analyses in a reasonable way. This is difficult because the stress-strain characteristics of soils are extremely complex, and the behavior of soil is nonlinear, inelastic, and highly dependent on the magnitudes of the stresses in the soil. The purpose of this report is to compare the characteristics of the hyperbolic, the Cam Clay and the Al-Shawaf and Powell stress-strain models for use in finite element analyses of earth masses. The principal objective of the study was to investigate the potential advantages and disadvantages of the Al-Shawaf-Powell model as compared to the other, more widely used stress-strain relation. GRA

N79-27756# Department of Energy, Bartlesville, Okla. Energy Research Center.
APPARATUS FOR RAPID AND PRECISE SURFACE AREA MEASUREMENTS OF UNCONSOLIDATED GEOLOGIC MATERIALS
R. M. Ray and T. C. Wesson Jul. 1978 18 p refs
(BETC/RI-78/8) Avail: NTIS HC A02/MF A01

The amounts of nitrogen adsorbed at liquid nitrogen temperatures on the surface of test samples was measured by the apparatus which contained a thermal conductivity detector. The Brunauer, Emmett, and Teller (BET) equation was then used to calculate the surface area of each test sample. In analyzing unconsolidated soil samples the instrument displayed a precision of about 2.2% for single point BET determinations and 5% for two point volumetric BET determinations. Overall accuracy in

analyzing soil samples was calculated to be within 6%. A single operator performed a maximum of 15 two point analyses for a total of 30 tests in an 8-hour day and had a long term average of 10 samples per 8 hour day for 562 samples tested. DOE

N79-27757# Technische Universitaet, Brunswick (West Germany). Inst. fuer Geophysik und Meteorologie.
ELECTROMAGNETIC INDUCTION IN A CONDUCTING PLATE WITH A CHARGED VERTICAL FINITE CYLINDER Ph.D. Thesis [ELEKTROMAGNETISCHE INDUKTION IN EINER LEITFAEHIGEN PLATTE MIT EINGELAGERTEM VERTIKALEM ENDLICHEM ZYLINDER]
H. Rodemaun 1978 190 p refs In GERMAN
(GAMMA-30) Avail: NTIS HC A09/MF A01

Geophysical sounding studies from the atmosphere, earth surface, and in bore holes yield information about the internal structure of the earth and the corresponding physical constants. Measurements of quasistationary alternating electric and magnetic fields provide such information. The geophysical problem is interpreted as that of a plate with a heterogeneous cylinder of the same height, but different conductivity. Infinite and zero substrate conductivities are considered, as is a half space with a semi-infinite cylinder. Various calculations are given. The results are compared with those obtained using other methods and from measurements. Agreement is good. Author (ESA)

N79-27758# Technische Universitaet, Brunswick (West Germany). Inst. fuer Geophysik und Meteorologie.
DIRECT INDICATING PROTON MAGNETOMETER [DIREKTANZEIGES PROTONENMAGNETOMETER]
F. Kuhnke 1978 51 p refs In GERMAN
(GAMMA-31) Avail: NTIS HC A04/MF A01

The proton precession magnetometer enables absolute measurements to be made of total magnetic field intensities. The instrument described utilizes the absolute accuracy with which the gyromagnetic ratio and associated physical constants can be determined. Frequency dependent coupling between two orthogonally crossed coils surrounded by a proton rich medium is employed. Continous measurements are possible, which is the great advantage of this instrument over that of Varian and Packard. Author (ESA)

N79-27759# Technische Universitaet, Brunswick (West Germany). Inst. fuer Geophysik und Meteorologie.
DEVELOPMENT OF A LOW DRIFT SQUID MAGNETOMETER FOR GEOPHYSICAL APPLICATIONS Ph.D. Thesis [ENTWICKLUNG EINES DRIFTARMEN SQUID MAGNETOMETERS FUER GEOPHYSIKALISCHE ANWENDUNG]
Reinhardt Geisler 1978 179 p refs In GERMAN
(GAMMA-32) Avail: NTIS AC A09/MF A01

The theory, development, calibration, and use of a high resolution magnetometer, based on the SQUID system for accurate measurement of the magnetic field of the earth and its variations are described. The magnetometer has a resolution of 2 X 0.0004 nT/square root Hz, a cut-off frequency of 200 Hz, a zero point stability of 0.001 nT and a long term stability of 0.001 nT. The performance of this system is better than that of a conventional magnetometer. The combined use of two SQUID magnetometers and two SQUID gradiometers in a helium cryostat enables magnetic fields, pulses, and electric fields to be measured with a single system. Author (ESA)

N79-27760# Bayerische Akademie der Wissenschaften, Munich (West Germany). Deutsche Geodaetische Kommission.
ADJUSTMENT OF LARGE GEODETIC NETWORKS USING A METHOD FOR GENERAL SPARSE MATRICES [AUSGLEICHUNG GROSSER GEODAETISCHER NETZE MIT VERFAHREN FUER SCHWACH BESETZTE MATRIZEN]
Hans-Joerg Schek, Franz Steidler, and Ulrich Schauer 1977 42 p refs In GERMAN; ENGLISH summary
(Ser-A-87; ISBN-3-7696-817-11) Avail: NTIS HC A03/MF A01

The adjustment of large geodetic networks with distance and direction observations leads to large sparse matrices of the normal equations where the share of the nonzero elements is small. The factorization algorithms for general sparse matrices, heretofor scarcely considered in geodesy, are shown to be very well suited for the solution of the occuring system of normal equations. Modern algorithmic factorization methods are compared with classical iterative methods (method of conjugate gradients; successive overrelaxation) for solving this standard geodetic problem and are proved to be superior due to a marked reduction in calculation time. Author (ESA)

N79-27761# Institute of Geological Sciences, Edinburgh (Scotland).
SPHERICAL HARMONIC MODELS OF THE GEOMAGNETIC FIELD
D. R. Barraclough London 1978 69 p refs
(Bull-8; ISBN-0-11-881269-6) Avail: NTIS HC A04/MF A01

A total of 264 spherical harmonic models of the geomagnetic field were found in the literature. The major characteristics of these models are described and the methods used to produce them are briefly discussed The coefficients of these models were converted, where necessary, to the Schmidt quasi-normalized form and are given in a table. A comprehensive bibliography of the original publications is given. Author (ESA)

N79-27762# Laboratorio di Ricerca e Technologia per lo Studio del Plasma nello Spazio, Frascati (Italy).
SEARCH FOR GRAVITATIONAL WAVES
E. Amaldi and G. Pizzella Mar. 1978 291 p refs
(LPS-78-3) Avail: NTIS HC A13/MF A01

A state-of-the-art review of the search for gravitational waves is presented. Special emphasis is given to resonant detectors, such as the one in Rome, Italy, as a practical example of the stage reached in 1977, of the pertinent technologies and methods. The main factors of gravitational waves as they are foreseen in the framework of Einstein's theory are summarized and the source of gravitational waves is discussed. Author (ESA)

N79-27763# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
ENERGETIC ELECTRON FLUXES IN THE EARTH'S OUTER MAGNETOSPHERE ACCORDING TO OBSERVATIONS FROM THE PROGNOZ-3 STATION
A. E. Antonova (Moscow State Univ.) and N. S. Nikolaeva 1978 33 p refs
(PR-415) Avail: NTIS HC A03/MF A01

The Energetic electron distribution (from 40 to 300 keV) at middle and high latitudes in the outer magnetosphere of the earth, observed at the Prognoz 3 station from February to October 1973, is discussed. Considerable electron fluxes exist above the noon stable trapping boundary in the region near the equatorial flank of the dayside polar cusp. Pronounced enhancement of the 40 keV electron intensity and some in 300 keV electron bursts were detected on the magnetopause which are agreement with electron layer measurements from the IMP and HEOS satellites and from the Prognoz 1 station. Quasiperiod modulation of energetic electron fluxes with a period of about 3 to 5 minutes was observed and can be associated with the magnetopause motion and with oscillations of the magnetic field of the earth. Author (ESA)

N79-27764# Research Inst. of National Defence, Stockholm (Sweden).
SEISMOLOGICAL RECORDINGS OF NUCLEAR EXPLOSIONS IN 1976 OBTAINED AT THE HAGFORS OBSERVATORY IN SWEDEN
Ingvar Nedgaard Nov. 1978 72 p refs
(FOA-C-20275-I1) Avail: NTIS HC A04/MF A01

Available source information on announced and presumed nuclear explosions in 1976 is summarized for a total of 41 explosions of which 34 were registered by the Hagfors Observatory. Short and long period seismic signals obtained from these explosions at the three substations of the Hagfords Observatory in Sweden are presented and normalized amplitude spectra calculated from these signals are given. Author (ESA)

N79-27765# Royal Netherlands Meteorological Inst., De Bilt.
SEISMOLOGICAL BULLETIN OF THE SEISMOGRAPH STATIONS IN THE NETHERLANDS, VOLUME 59, 1971
1978 125 p
(KNMI-108-59) Avail: NTIS HC A06/MF A01

The geographic coordinates of the seismograph stations located in the Netherlands are given. The instruments used at

each measuring point are briefly described. The method used for measuring microseismic activity is discussed. An explanation of calculations made as well as a complete record of seismic readings taken from January 1 to December 30, 1971 is included. Author (ESA)

N79-27766# Royal Netherlands Meteorological Inst., De Bilt.
A COMPUTER PROGRAM FOR CALCULATING INFRARED FLUXES
W. Kohsiek 1978 33 p refs
(KNMI-WR-78-15) Avail: NTIS HC A03/MF A01

A computer program based on the Elsasser chart (1942), using input data from tables by Elsasser and Culberstone, was prepared as a computerized version of the radiation charts has operative advantages. The computer program can be used for calculating infrared fluxes at every level in the atmosphere, downward as well as upward. The presence of clouds can be included in a simple way. In some unavoidable approximations (e.g. the pressure profile assumed) emphasis was laid on the accuracy of the calculations for levels not higher than the first few kilometers. The total of the inaccuracies introduced by approximations in the calculations is not more than a few per cent. This figure is compared with inaccuracies introduced by Elsasser's concept which are on the order of ten per cent. The computer time required for the calculation of one radiation flux is about one second. Author (ESA)

N79-27767# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
REEVALUATION OF MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES USING DISTANCE AS DETERMINANT
Rutlage J. Brazee Jan. 1979 173 p refs
(PB-294439/5; NOAA-TM-EDIS-NGSDC-4; NOAA-79031602) Avail: NTIS HC A08/MF A01 CSCL 08K

An assumption is made that the attenuation of earthquake intensity parallels or is representative of the dissipation of earthquake energy and thus varies smoothly with distance outward from the center. A model embodying this concept is developed, based on 400,000 earthquake intensity elements collected by the U.S. Coast and Geodetic Survey and its successor agencies during the period from 1928-74. Curves for each intensity element of the Modified Mercalli Intensity Scale of 1931 are then derived and fitted to the model. A revised intensity scale is assembled by reassigning the intensity elements in accordance with the results of the fitting process. GRA

N79-27768# Woods Hole Oceanographic Institution, Mass. Dept. of Geology and Geophysics.
GEOLOGY OF THE PASSIVE MARGIN OF NEW ENGLAND Ph.D. Thesis
James A. Austin, Jr. Feb. 1979 272 p refs
(Grants NOAA-04-7-158-44104; NOAA-04-8-M01-149)
(PB-294473/4; WHOI-79-27; NOAA-79031603) Avail: NTIS HC A12/MF A01 CSCL 08G

Rifting between northeastern North America and Morocco during the Middle-Late Triassic produced a complex series of horsts and grabens in Precambrian/Paleozoic crust. Intra-rift sediments consist of clastics, evaporites, and volcanics. Continental separation occurred and sea-floor spreading began 195-190 my B.P. The boundary between normal continental crust and crust radically altered by fracturing and intrusion may be represented by a pronounced basement hingezone. Prior to margin subsidence, extensive sub-aerial erosion carved a break-up uncomformity reflector K which truncated pre-existing rift structures and which must be approximately the same age as the oldest oceanic crust. Within the overlying drift sediments, six acoustic horizons have been regionally traced and correlated with strata samples by a well drilled on the western Scotian Shelf. The total sediment thickness of both rift and drift sequences beneath Georges Bank may be 13 km, of which more than 80% is Jurassic in age. Author

N79-27559# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
ANALYSIS OF 1ST AND 2ND MOMENTS OF THE CONCENTRATION DISTRIBUTION FOR NEAR GROUND RELEASES OF TRACERS IN THE ATMOSPHERE
Allen H. Weber and J. C. R. Hunt (Cambridge Univ., England) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 165-172 refs (For primary document see N79-27543 18-42)
(Contract AT(07-2)-1)
Avail: NTIS HC A99/MF A01

N79-27560# Atmospheric Environment Service, Downsview (Ontario).
MEASUREMENTS OF DISPERSION COEFFICIENTS IN COLD ENVIRONMENT
F. H. Fanaki *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 173-185 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27563# National Oceanic and Atmospheric Administration, Oak Ridge, Tenn. Atmospheric Turbulence and Diffusion Lab.
PRAIRIE GRASS REVISITED: OPTIMUM INDICATORS OF VERTICAL SPREAD
Gary A. Briggs and Kenneth R. McDonald (North Carolina State Univ., Raleigh) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 209-220 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27564# Kernforschungsanlage, Juelich (West Germany). Central Div. for Radiation Protection.
NEW SETS OF DIFFUSION PARAMETERS RESULTING FROM TRACER EXPERIMENTS IN 50 AND 100 METRES RELEASE HEIGHT
K. J. Vogt, H. Geib, and G. Polster *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 221-239 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27569# Atmospheric Environment Service, Downsview (Ontario).
EXPERIMENTS WITH A MARKOV CHAIN DISPERSION MODEL APPLIED TO VERTICAL DISPERSION IN THE SURFACE LAYER
John D. Reid *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 291-300 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27585# Universite Catholique de Louvain (Belgium). Inst. d'Astronomie et de Geophysique.
SENSITIVITY OF A GAUSSIAN PLUME MODEL TO THE VERTICAL DISPERSION PARAMETERS
A. L. Berger and Chr. Legros *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 485-497 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N79-27769# Finnish Meteorological Inst., Helsinki.
ON THE DIURNAL VARIATION OF WIND IN FINLAND
Raino Heino Apr. 1978 24 p refs
(TR-17; ISBN-951-697-101-6) Avail: NTIS HC A02/MF A01

The diurnal variation of wind speed and direction in Finland was studied based on the hourly observations at Finnish airport weather stations. Results show that the periodic diurnal variation of wind speed is generally more than 50% of the total variation in summer and must be taken into account in the forecasts of

wind. In winter the passage of cyclonic disturbances determines the variations of wind speed and the periodic variation is below 10% of the total variation. The average calm frequency varies between 0 and 50% depending strongly on the location and the time of day. The highest frequency is in most cases observed at sunrise in midsummer. The diurnal variation of wind direction is notable only in coastal regions where the land and sea breeze system prevails in spring and summer. J.M.S.

N79-27770*# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.

NUMERICAL SIMULATION OF VTPR TEMPERATURE RETRIEVALS IN A SEVERE STORM ENVIRONMENT Final Report, 1 Apr. 1978 - 31 Mar. 1979

Thomas H. VonderHaar and Donald W. Hillger Jun. 1979 38 p refs

(Grant NsG-5259)

(NASA-CR-158761) Avail: NTIS HC A03/MF A01 CSCL 04B

Environmental conditions prior to convective development on the Great Plains of the U.S. on one case study day were investigated using the high-resolution infrared radiation sounder (HIRS) on Nimbus 6. A dual-retrieval scheme was developed to retrieve both lower tropospheric moisture and temperature parameters from the HIRS radiances. Total precipitable water, surface dew point temperatures, and stability indices were analyzed at a resolution of up to 30 Km on this day. Correlations with interpolated NES rawinsonde values were high and intrinsic noise levels were low. The true quality of the mesoscale analyses, however, is only seen by examining the small scale features at a scale of approximately 100 Km. Perturbations on the dry line feature for this day were seen in the satellite data, although the dry line position was just as easily picked up by surface observations. Convective development 2 1/2 hours later did seem to correlate well with the local maxima of moisture and instability seen in the satellite analyses. A.R.H.

N79-27771# Schweizerische Meteorologische Zentralanstalt, Zurich.

THE CATALOGUE OF OBJECTIVE STATISTICAL WEATHER FORECASTS FOR THE NORTHERN ALPS, THE VALAIS, AND NORTHERN AND CENTRAL GRISONS [KATALOG OBJETKTIV-STATISTISCHER WETTERPROGNOSEN FUER DIE ALPENORDSEITE, DAS WASSIS SOWIE NORD- UND MITTELBUENDEN]

H. W. Courvoisier 1978 59 p refs In GERMAN; ENGLISH summary

(SZ-ISSN-0080-7346) Avail: NTIS HC A04/MF A01

A method for regional forecasts on an objective statistical basis using Schuepp's classification of synoptic situations and the numerical prediction charts is discussed. Numerical values of sunshine duration and precipitation for 10 stations and for 70 synoptic situations are presented. The method was specially designed for application to forecasts two or three days ahead. A test on forecasts shows that the rates of success obtained by the objective method were about 5% higher than those obtained by the conventional method. R.E.S.

N79-27772*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METEOROLOGICAL AND OPERATIONAL ASPECTS OF 46 CLEAR AIR TURBULENT SAMPLING MISSIONS WITH AN INSTRUMENTED B-57B AIRCRAFT. VOLUME 2, APPENDIX C: TURBULENCE MISSIONS

David E. Waco (California Energy Resources Conserv. and Develop. Comm., Sacramento) May 1979 188 p refs

(NASA-TM-80045) Avail: NTIS HC A09/MF A01 CSCL 04B

The results of 46 clear air turbulence (CAT) probing missions conducted with an extensively instrumented B-57B aircraft are summarized from a meteorological viewpoint in a two-volume technical memorandum. The missions were part of the NASA Langley Research Center's MAT (Measurement of Atmospheric Turbulence) program, which was conducted between March 1974, and September 1975, at altitudes ranging up to 15 km. Turbulence samples were obtained under diverse conditions including mountain waves, jet streams, upper level fronts and troughs, and low altitude mechanical and thermal turbulence. CAT was encountered on 20 flights comprising 77 data runs. In all, approximately 4335 km were flown in light turbulence, 1415 km in moderate turbulence, and 255 km in severe turbulence during the program. Author

N79-27773# National Oceanic and Atmospheric Administration, Norman, Okla. National Severe Storms Lab.

THUNDERSTORM GUST FRONTS: OBSERVATIONS AND MODELING Final Report, Mar. 1976 - Dec. 1978

J. T. Lee, J. Stokes, Y. Sasaki (Oklahoma Univ., Norman), and T. Baxter (Oklahoma Univ., Norman) Dec. 1978 113 p refs (Contract DOT-FA76WAI-622; FAA Proj. 154-451-014)

(AD-A068425; FAA-RD-78-145) Avail: NTIS HC A06/MF A01 CSCL 04/2

Gust front structures as observed and as modeled are reviewed, and a mean model is presented. Integrated observations from the 461 m meteorologically instrumented tower at Oklahoma City, aircraft, weather satellites, and Doppler radar are compared to one and two dimensional models to provide a better understanding of the gust front. In the mean, updrafts of 3 m s-1 accompany the gust front's approach. Horizontal wind shears are 8 m s-1 per km. Gust front cases in 1976 and 1977 are presented along with a data log of tower observations. Aircraft observations during gust front flights are discussed. S.E.S.

N79-27774# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

DIURNAL RAINFALL VARIABILITY IN NORTHEAST BRAZIL

Vernon Edgar Kousky May 1979 40 p refs

(INPE-1487-RPE/033) Avail: NTIS HC A03/MF A01

Evidence is presented, which shows that seasonal variations, noted for areas of the north coast, are linked with variations in the low level mean flow. Seasonal variations in the mean monthly rainfall eastern coastal areas are shown to correlate well with the intensity of the land breeze. Author

N79-27775# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

RELATION OF RICHARDSON NUMBER TO THE CURVATURE OF THE WIND PROFILE

Yelisetty Viswanadham May 1979 15 p refs

(INPR-1486-RPE/032) Avail: NTIS HC A02/MF A01

Values of Richardson number and the wind profile curvature in the atmospheric surface layer were evaluated from experimental data. The relationship between the Richardson number and the wind profile curvature shows some scatter, but gives satisfatory agreement with the theoretical relation obtained from Businger's theory. Author

N79-27776# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

EFFECTS OF THE LIBERATION OF THE LATENT HEAT OF CONDENSATION ON THE DEVELOPMENT OF DISTURBANCES AT MEDIAN LATITUDES [EFEITOS DA LIBERACAO DE CALOR LATENTE DE CONDENSACAO NO DESENVOLVIMENTO DE PERTURBACOES EM LATITUDES MEDIAS]

Nelson Jesus Ferreira Mar. 1979 91 p refs In PORTUGUESE; ENGLISH summary

(INPE-1438-TDL/005) Avail: NTIS HC A05/MF A01

Effects of latent heat of condensation on middle latitude disturbances are discussed using initially a two-layer quasi-geostrophic model. The instability characteristics, vertical structure and energy transformations of unstable disturbances are analyzed using the classical method of eigenvalues. Results show the existence of medium scale disturbances, in addition to the conventional baroclinic disturbances. Since these medium-scale disturbances possess small wavelengths, the validity of the quasi-geostrophic approximation becomes questionable. Therefore, a non-geostrophic model, i.e., the balance model is also used. Author

N79-27777# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.

THE 19702A GSRS MISSLE NUMBER 10, ROUND NUMBER, B-1, 6 FEBRUARY 1979 Meteorological Data Report

6 Feb. 1979 19 p

(DA Proj. 1T6-65702-D-127)
(AD-A067676; ECOM-DR-987) Avail: NTIS
HC A02/MF A01 CSCL 04/2

Meteorological data gathered for the launching of 19702A GSRS, Missile Number 10, Round Number B-1, are presented in tabular form. Author (GRA)

N79-27778# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
THE 12824C LANCE, MISSILE NUMBER 4661, ROUND NUMBER 324 NPL Meteorological Data Report
Mar. 1979 50 p refs
(AD-A067761; ECOM-DR-985) Avail: NTIS
HC A03/MF A01 CSCL 04/2

Meteorological data gathered for the launching of 12824C Lance, Missile Number 4661, Round Number 324 NPL, are presented in tabular form. Author (GRA)

N79-27779# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
THE 12831D LANCE MISSILE NUMBER 3306, ROUND NUMBER 323, ESL Meteorological Data Report, 2 Nov. 1978
Mar. 1979 36 p refs
(DA Proj. 1T6-65702-D-127)
(AD-A067687; ECOM-DR-982) Avail: NTIS
HC A03/MF A01 CSCL 04/2

Meteorological data gathered for the launching of 12831D Lance, missile number 3306, round number 323 ESL, are presented in tabular form. Author (GRA)

N79-27780# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
THE 19303 GSRS, MISSILE NUMBER 1013, ROUND NUMBER V-13, Meteorological Data Report, 1 Dec. 1978
Mar. 1979 19 p refs
(DA Proj. 1T6-65702-D-127)
(AD-A067686; ECOM-DR-983) Avail: NTIS
HC A02/MF A01 CSCL 04/2

Meteorological data gathered for the launching of 19303 GSRS Missile Number 1013, Round Number V-13, are presented in tabular form. Author (GRA)

N79-27781# Naval Weather Service Detachment, Asheville, N. C.
SUMMARY OF METEOROLOGICAL OBSERVATIONS, SURFACE (SMOS) CORPUS CHRISTI, TEXAS Reference Report, 1945 - 1977
Jul. 1978 368 p
(AD-A067679) Avail: NTIS HC A16/MF A01 CSCL 04/2

This data report consists of a six part statistical summary of surface weather observations. The six parts are: Part A - Weather Conditions/Atmospheric Phenomena, Part B - Precipitation/Snowfall/Snow Depth, Part C - Surface Winds, Part D - Ceiling versus Visibility/Sky Cover, Part E - Psychrometric summaries, and Part F - Station Pressure/Sea Level Pressure. GRA

N79-27782# Naval Weather Service Detachment, Asheville, N. C.
SUMMARY OF METEOROLOGICAL OBSERVATIONS, SURFACE (SMOS), LAKEHURST, NEW JERSEY Reference Report, 1945 - 1977
Jul. 1978 375 p
(AD-A067683) Avail: NTIS HC A16/MF A01 CSCL 04/2

This data report consists of a six part statistical summary of surface weather observations. The six parts are: Part A - Weather Conditions/Atmospheric Phenomena, Part B Precipitation/Snowfall/Snow Depth, Part C - Surface Winds, Part D - Ceiling versus Visibility/Sky Cover, Part E - Psychrometric Summaries, and Part F - Station Pressure/Sea Level Pressure. Author (GRA)

N79-27783# Naval Weather Service Detachment, Asheville, N. C.
SUMMARY OF METEOROLOGICAL OBSERVATIONS, SURFACE (SMOS), IMPERIAL BEACH, CALIFORNIA Reference Report, 1945 - 1977
Jul. 1978 353 p
(AD-A067680) Avail: NTIS HC A16/MF A01 CSCL 04/2

This data report consists of a six part statistical summary of surface weather observations. The six parts are: Part A - Weather Conditions/Atmospheric Phenomena, Part B - Precipitation/Snowfall/Snow Depth, Part C - Surface Winds, Part D - Ceiling versus Visibility/Sky Cover, Part E - Psychrometric Summaries, and Part F - Station Pressure/Sea Level Pressure. GRA

N79-27784# Pacific Missile Test Center, Point Mugu, Calif.
PRELIMINARY ASSESSMENT OF TEMPERATURE INDUCED RADIOSONDE HUMIDITY ERRORS AND EFFECTS ON APPARENT LOW-LEVEL REFRACTIVE STRUCTURES, BLOCK PROGRAM WF 52-55-091
R. A. Helvey 1 Feb. 1979 27 p refs
(AD-A068670; PMTC-TP-79-09) Avail: NTIS
HC A03/MF A01 CSCL 04/2

Standard radiosonde measurements and procedures are subject to significant temperature-induced humidity errors in the near surface layer. These errors, when experienced at coastal locations and applied to open ocean conditions may result in spurious surface-based ducts which have serious implications for the authenticity and application of world-wide refractive climatologies in naval planning and operations, and in the development and verification of prediction techniques. Efforts are underway at the Pacific Missile Test Center to determine the magnitude of this problem, and to recommend modified measurement procedures and correction factors that can be applied to existing data. GRA

N79-27785# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
COMPUTER MODELING OF ATMOSPHERIC ICE ACCRETION
S. F. Ackley and M. K. Templeton Mar. 1979 43 p refs
(DA Proj. 4A1-61102-AT-24)
(AD-A068582; CRREL-79-4) Avail: NTIS HC A03/MF A01
CSCL 08/12

A computer model is described to compute the amount of ice accretion on an object under a variety of initial conditions. Numerical techniques are best applied to these problems because of time dependent effects governing the amount of ice collected and also the variety of initial conditions that can lead to ice accumulation. The helicopter rotor icing problem adds an additional complexity since the velocity along the rotor blade varies over a wide range strongly affecting the amounts of ice collected at different blade positions. The physics of ice accretion is reviewed and the accounting for time-dependence in the computer model is described. Some model results are presented and indicate the dependence of ice accretion on velocity, droplet sizes, cloud liquid water content, and temperature for a cylindrical object of constant size. GRA

N79-27786# Battelle Pacific Northwest Labs., Richland, Wash.
STATISTICAL NATURE OF COLD FRONTS WITHIN THE GULF OF MEXICO AND THEIR POTENTIAL INFLUENCE ON OTEC OPERATIONS
S. L. Ulanski Dec. 1978 26 p refs
(Contract EY-76-C-06-1830)
(PNL-2878) Avail: NTIS HC A03/MF A01

Selected aspects of cold fronts as they penetrate southward into the Gulf of Mexico are studied in terms of the feasibility of utilizing the temperature difference between the tropical ocean surface and depths of approximately 1500 m for the production of power. Long term, greater than 25 years, meteorological data from the National Climatic Center was used as the basis for determining the impact of cold fronts in the Gulf of Mexico region. In particular, surface air temperature and wind direction were analyzed daily during the months of December, January, and February. The drop in temperature as well as the directional wind shift were the criteria for the frontal passage. Surface observation data from Tampa and Key West, Florida were used. DOE

N79-27787# Royal Netherlands Meteorological Inst., De Bilt.
WIND TRAJECTORY MODELS [BEPALING VAN BRONGEBIEDEN EN TRAJEKTORIAEN]

F. Cannemeijer, J. Reiff, and M. J. M. Saraber 1978 31 p refs In DUTCH; ENGLISH summary
(KNMI-WR-78-6) Avail: NTIS HC A03/MF A01

The accuracy of the operational numerical model BK 27 used for wind prognoses was found sufficient to attempt a specialized definition of a trajectory model. Six cases are described in which, by hand methods, 24 hr trajectories were constructed for both the 500 mbar and the 850 mbar level. The differences in trajectories calculated from analysis and calculated from prognosis are small enough to justify the construction of a computer trajectory model. Some conclusions and recommendations are given. Author (ESA)

N79-27788# Royal Netherlands Meteorological Inst., De Bilt.
CHANGES IN THE WEATHER: AN OBJECTIVE APPROACH [WEERSOMSLAGEN. EEN OBJEKTIVE BENADERING]
J. Oerlemans 1978 23 p ref In DUTCH; ENGLISH summary
(KNMI-WR-78-10) Avail: NTIS HC A02/MF A01

An objective approach to breaks in the weather is presented. The method is based on a comparison of a typical break (defined as $fx = a.\arctan(bx)/\arctan(bn)$ where $x = -n,\ldots,n$) with an interval from a local record of, for instance, daily temperature. A break quality, defined as the ratio of the amplitude to the associated rms-difference between the typical and observed break, is defined for each day. Since the break quality is a dimensionless quantity, various weather elements can be compared immediately. The procedure was carried out for daily values of temperature, sunshine, and precipitation as observed at De Bilt during the period 1949 to 1974. Daily temperature gives the highest break qualities whereas precipitation hardly shows clear breaks. Results lead to the definition of a real weather change as an observed break in some minimum value (depending on the particular application). Author (ESA)

N79-27789# Royal Netherlands Meteorological Inst., De Bilt.
ON THE CALCULATION OF LARGE SCALE VERTICAL CIRCULATION USING A THREE PARAMETER QUASIGEOSTROPHIC NUMERICAL MODEL [OVER DE NAUWKEURIGHEID VAN VERTIKALE BEWEGINGEN BEREKEND MET EEN BAROKLEIN 3-PARAMETER MODEL]
J. D. Opsteegh 1978 45 p refs In DUTCH; ENGLISH summary
(KNMI-WR-78-12) Avail: NTIS HC A03/MF A01

The accuracy of proposed calculations for large scale vertical circulation in the atmosphere computed with a three parameter quasigeostrophic numerical model, is examined. For a few synoptic situations with well defined frontal disturbances the vertical circulation is computed and results are compared with IR satellite cloud pictures. The use of the computed vertical velocities for rainfall predictions and for the computation of time averaged vertical transports of momentum and temperature is described. The effects of using a rather coarse grid in the horizontal as well in the vertical are studied. Neglecting surface friction, orography, and release of latent heat, the use of a constant static stability parameter and the quasi-geostrophic assumption were also examined for their effect on the accuracy of the model. Author (ESA)

N79-27790# Royal Netherlands Meteorological Inst., De Bilt.
A COMPARISON OF SURFACE DIFFUSION OF AIR POLLUTANTS OVER WATER AND LAND (AN ARTIFICIAL ISLAND IN THE NORTH SEA) [DE VERSPREIDING VAN ENKELE LUCHTVERONTREINIGENDE STOFFEN, VANAF EEN EILAND IN DE NOORDZEE. ONDERZOEK OP VERZOEK VAN DE STUURGROEP STUDIE NOORDZEE EILAND EN TERMINAL (STUNET)]
A. A. M. Holslag and F. T. M. Nieuwstadt 1978 39 p refs In DUTCH; ENGLISH summary
(KNMI-WR-78-13) Avail: NTIS HC A03/MF A01

Differences between a dispersion over land and a dispersion over a water surface due to the low atmospheric turbulence intensity associated with water surfaces are discussed as an introduction to the description of a standardized model for the calculation of concentrations averaged over a long period (year or season). This model is derived from the Gaussian plume formula used on land surfaces, modified to take into account different dispersion conditions found over a water surface. The model is applied to projected emissions from an island. Concentration patterns averaged over one year were calculated for the components NOX, CO, CxHy, H2S, SO2, and particulates. Author (ESA)

N79-27791# Royal Netherlands Meteorological Inst., De Bilt.
WIND AND WAVE CLIMATE IN THE NETHERLANDS SECTOR OF THE NORTH SEA BETWEEN 53 DEG AND 54 DEG NORTH LATITUDE
E. Bouws 1978 113 p refs Prepared in cooperation with Neth. Oil and Gas Exploration and Production Assoc.
(KNMI-WR-78-9) Avail: NTIS HC A06/MF A01

Wave data were collected from March 1973 to February 1976 in the Netherlands shelf area. Wave measurements are compared with wind speed data collected in the same area from 1949 to 1975. A probable 50-year maximum wave height is predicted. The effects of swell entering the area from the North Sea, bottom topography, and the relatively short period of wave data measurement are considered relative to the prediction. It is concluded that the wave spectrum for extreme wind conditions in a shallow area (30m depth) can be inferred from the wave height only. However, a detailed analysis of wave spectra is needed to evaluate the contribution of swell under various conditions. Author (ESA)

N79-27792# World Meteorological Organization, Geneva (Switzerland).
THE APPLICATION OF ATMOSPHERIC ELECTRICITY CONCEPTS AND METHODS TO OTHER PARTS OF METEOROLOGY
Hans Dolezalek, ed. 1978 145 p refs
(WMO-507; TN-162; ISBN-92-63-10507-3) Avail: NTIS HC A07/MF A01; WMO, Geneva Sw Fr 20

This Technical Note shows how atmospheric electricity concepts and methods may be used in weather analysis and prediction and in other fields of atmospheric physics as well as in climatology. Mutual misconceptions exist between experts in atmospheric electricity and meteorologists about the possibilities offered by atmospheric electrical parameter values on the one hand and the actual requirements of the meteorologist on the other. Criteria are suggested for assessing the applicability of atmospheric electricity data. Author (ESA)

N79-27793# Research Inst. of National Defence, Stockholm (Sweden).
CHARACTERISTICS OF TURBULENCE IN THE ATMOSPHERIC BOUNDARY LAYER
Sture Wickerts 1978 18 p refs
(FOA-Vol-12-No-2; ISBN-91-7056-051-x) Avail: NTIS HC A02/MF A01

Turbulence was measured with three-axis sonic anemometers. The results which are presented are from three test periods on different sites. In all cases the sensors were mounted on masts six meters above ground. Data were sampled with ten values per second during 15-50 minutes, and were recorded on magnetic tape. During the third test period the data were also partly treated on-line in a minicomputer. Evaluation and analysis of the data were in all cases done on an IBM 360 computer. Characteristics of turbulence in space and time are evaluated. A result of particular interest is that there is evidence that wind fluctuations sometimes do not follow a normal distribution, but rather vary with time as a square wave shifting sign at random. In an appendix the covariance and spectrum of a stationary Markov process with two states and constant transition intensities are derived. Author (ESA)

N79-27794# Research Inst. of National Defence, Stockholm (Sweden).
MEASUREMENTS OF RAINFALL INTENSITY: INSTRUMENTATION AND DATA PROCESSING
Sture Wickerts and Sten Granath Jan. 1979 32 p Sponsored jointly by Swed. Telecomm. Admin. Radio Dept. and Natl. Defence Res. Inst. Dept. 3
(FOA-C-30157-E2,E1) Avail: NTIS HC A03/MF A01

Rainfall intensity measurements have been made in Sweden on a systematic basis since June 1977 and are planned to continue until at least 1980. This data is being used in a statistical study of the effect of raindrop frequency distributions on radio

wave propagation in the GHz range. Equipment including the data collecting system and the rain gages in use are described as well as data handling procedures, correction techniques, and calibration procedures. A data base containing minute to minute rainfall rates for occasions when rain was recorded at all 24 rain gages in the test area also exists. Results confirm that high raindrop concentrations cause radio wave attenuation through scattering and absorption, while also causing radar echoes.
Author (ESA)

N79-27795# Royal Netherlands Meteorological Inst., De Bilt.
PRECIPITATION, 1977
1978 124 p In DUTCH and ENGLISH
(KNMI-117-77) Avail: NTIS HC A06/MF A01; Roy. Neth. Meteorol. Inst. DFL 10

Rainfall observations made in the Netherlands during 1977 are presented as data tables. A brief description of the precipitation stations, their locations, and of the measurement method is given. The rain gages used are also described. Author (ESA)

N79-27796# Royal Netherlands Meteorological Inst., De Bilt.
AVERAGE WINTER TEMPERATURES AT DE BILT (THE NETHERLANDS): 1634 - 1977
H. M. vandenDool, H. J. Kritnen, and C. J. E. Schuurmans 1978 15 p refs
(KNMI-V-305) Avail: NTIS HC A02/MF A01

A time series of Dutch winter temperatures comprising 350 years is analyzed. The older part of the series is found sufficiently reliable to be of importance in the investigation of climate and climatic change in North-Western Europe. The analysis reveals the pressure of a warming trend. A spectral representation of the series shows two significant deviations from a white noise spectrum, namely a strong peak between 2.2 and 2.5 years and a dip between 4 and 5 years. Author (ESA)

N79-27797# Royal Netherlands Meteorological Inst., De Bilt.
SURFACE WIND ANALYSIS OVERLAND IN THE NETHERLANDS, BASED ON AN OPTIMUM INTERPOLATION METHOD
G. J. Cats 1978 22 p refs
(KNMI-WR-78-17) Avail: NTIS HC A02/MF A01

An analysis scheme for over land surface winds in the Netherlands is described. The chosen scheme is based on an optimum interpolation method. The covariances and climatology of wind observations needed in this method are modelled and model parameters are chosen to fit the sub-synoptic scales encountered in the Netherlands. The optimum interpolation method and the covariance and climatology models are verified simultaneously. The method gives a root-mean-square error in wind speed estimates of 1.5 m/sec; the error is more or less normally distributed with maximum values of about 7 m/sec. These maximum values are often associated with heavy shower systems. Author (ESA)

N79-27798# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
OPTIMUM INTERPOLATION OF RADIOSONDE AND SATELLITE-DERIVED TEMPERATURE FIELDS M.S. Thesis
Young Paul Yee Aug. 1978 97 p refs
(Grants NSF ATM-76-21307; NSF ATM-78-00530)
(PB-293017/0; AS-PAPER-292; ISSN-0067-0340) Avail: NTIS HC A05/MF A01 CSCL 04B

An optimum interpolation scheme which interpolates temperature measurements to a specified mesocale network of gridpoints is proposed. The analysis incorporates conventional synoptic-scale radiosonde observation at 00Z for thirty-one consecutive days and VTPR satellite-derived temperatures for a particular case study day. Structure functions were determined from the statistical nature of the 700 mb, 500 mb, and 300 mb temperature fields for this period. From these meteorological field samples, normalized auto-correlation and normalized mutual-correlation functions for the RAOB's and satellite-retrieved temperatures were calculated assuming general isotropic and homogeneous conditions over the region. GRA

N79-27799# North Carolina State Univ. at Raleigh. Dept. of Marine Science and Engineering.
CONTINENTAL MARGIN ATMOSPHERIC CLIMATOLOGY AND SEA LEVEL 1974-1975
L. J. Pietrafesa, R. Damato, C. Gabriel, and R. J. Sawyer, Jr. Nov. 1978 217 p refs
(Contract E(38-1)-902; Grant NOAA-4-06-158-44054)
(PB-293734/0; UNC/SG-78/09; UNC/SG-78/2; NOAA-79030205) Avail: NTIS HC A10/MF A01 CSCL 04B

Atmospheric wind and pressure were examined and correlated with coastal sea level changes at various coastal stations along the South Atlantic Bight. The atmospheric climate overlying the South Atlantic Bight is determined by both polar and tropical marine air masses, resulting in a temperature rainy climate with mild winters, long hot summers, and adequate moisture in all seasons. Wintertime extratropical cyclones can affect the coastal oceanic circulation in a number of direct and indirect ways. Wind stress reversals, noted at all of the meteorological stations, occurred on time scales of several days to several weeks, which is the typical period of forcing within the atmospheric stress continuum. GRA

N79-27800# Illinois State Water Survey, Urbana.
SOLAR ENERGY INFORMATION AND DATA FOR ILLINOIS
Stanley A. Changnon 1978 67 p refs
(PB-292712/7; ISWS/CIR-133/78) Avail: NTIS HC A04/MF A01 CSCL 04B

This solar data compendium contains a minimum of text and consists mainly of tables and graphs, largely assembled from a wide variety of publications. The information presented is largely based on averages for various records and periods (daily, weekly, monthly, and annually). Where available, various probabilities of events (such as runs of days with sunshine or radiation) are given. Average monthly values of temperatures (and extremes of temperatures), relative humidity, and winds are offered for various state locales. Various weather conditions that will create problems for solar collectors are reviewed. Average and extreme values of hail, thunderstorms, pollution, snow, and ice are included. GRA

N79-27550# Atmospheric Environment Service, Downsview (Ontario).
A NUMERICAL MODEL OF FLOW ABOVE GENTLE TOPOGRAPHY WITH CHANGES IN SURFACE ROUGHNESS
P. A. Taylor *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 69-77 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27551# Systems Applications, Inc., San Rafael, Calif.
DEVELOPMENT AND VALIDATION OF A THREE-DIMENSIONAL WIND MODEL FOR AIR QUALITY ANALYSIS IN COMPLEX TERRAIN
Mei-Kao Liu, Mark A. Yocke, and James McElroy (EPA, Las Vegas, Nevada) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 79-88 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27552# Western Research and Development, Calgary (Alberta).
BIVANE STUDIES OF AIR FLOW OVER IRREGULAR TERRAIN
D. M. Leahey and M. J. E. Davies *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 89-97 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27553# National Oceanic and Atmospheric Administration, Oak Ridge, Tenn. Atmospheric Turbulence and Diffusion Lab.
PARAMETERIZING ATMOSPHERIC DIFFUSION
F. A. Gifford *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 107-114 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27554# Pennsylvania State Univ., University Park. Dept. of Meteorology.
THEORETICAL BACKGROUND FOR THE CHOICE OF STABILITY PARAMETERS
Hans A. Panofsky and Robert Lipschutz *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 115-119 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27555# Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).
INFLUENCE OF THE TURBULENCE TYPING SCHEME UPON THE YEARLY AVERAGE CONCENTRATIONS BY MEANS OF A BI-GAUSSIAN MODEL
J. G. Kretzschmar and I. Mertens *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 121-132 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27556# Technischer Uerberwachungs-Verein Rheinland, e.V., Cologne (West Germany).
CRITICAL REVIEW OF DISPERSION COEFFICIENTS MEASURED AND APPLIED IN THE FEDERAL REPUBLIC OF GERMANY
Lother Kropp *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 133-143 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27557# Brookhaven National Lab., Upton, N. Y.
A COMPARATIVE STUDY OF DIFFUSION CLASSIFICATION BY LAPSE RATE, GUSTINESS AND A MODIFIED PASQUILL METHOD
Gilbert S. Raynor and Janet V. Hayes *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 145-154 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27558# Environmental Protection Agency, Research Triangle Park, N.C. Meteorology and Assessment Div.
USE OF WIND FLUCTUATION STATISTICS TO ESTIMATE DISPERSION NEAR ROADWAYS
William B. Petersen *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 155-164 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27561# Environmental Protection Agency, Research Triangle Park, N.C.
TURBULENT STRUCTURE OF THE URBAN SURFACE BOUNDARY LAYER
J. F. Clarke, J. K. S. Ching, F. S. Binkowski, and J. M. Godowitch *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 187-196 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27566# Norwegian Inst. for Air Research, Lillestrom.
DISPERSION PARAMETERS DETERMINED FROM MEASUREMENTS OF WIND FLUCTUATIONS (SIGMA SUB THETA), TEMPERATURE AND WIND PROFILES
Bjarne Sivertsen *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 251-261 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27570# California Univ., Livermore. Lawrence Livermore Lab.
OBJECTIVE WIND FIELD PATTERN CHARACTERIZATION
John J. Walton and Christine A. Sherman *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 301-312 refs (For primary document see N79-27543 18-42)
(Contract W-7405-eng-48)
Avail: NTIS HC A99/MF A01

N79-27571# California Univ., Livermore. Lawrence Livermore Lab.
MASS-CONSISTENT WIND FIELD MODELING: FINITE DIFFERENCE VIS-A-VIS FINITE ELEMENT
Dieter R. Tuerpe, Daniel J. Rodriguez, Philip M. Gresho, and Robert L. Sani *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 313-322 refs (For primary document see N79-27543 18-42)
(Contract W-7405-eng-48)
Avail: NTIS HC A99/MF A01

N79-27577# Tekmekron, Inc., Berkeley, Calif. Meteorology Group.
A CLIMATOLOGY OF METEOROLOGICAL PARAMETERS FOR SHORT-RANGE DISPERSION AND LONG-RANGE TRANSPORT
Brand L. Niemann and Peter M. Mayerhofer *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 387-396 refs (For primary document see N79-27543 18-42)
(Contract EPA-68-01-1921)
Avail: NTIS HC A99/MF A01

N79-27584# Environment Canada, Halifax (Nova Scotia).
TESTS OF THE CLIMATOLOGICAL DISPERSION MODEL AND GAUSSIAN MODELS AT THE STRAIT OF CANSO AND AT LINGAN, NOVA SCOTIA
R. W. Shaw, E. W. Brandon, and K. G. Hamilton *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 475-484 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27591# Pennsylvania State Univ., University Park. Dept. of Meteorology.
NUMERICAL SIMULATIONS OF COASTAL-ZONE BOUNDARY LAYER VENTILATION AND POLLUTION TRANSPORT
Thomas T. Warner, Richard A. Anthes, and Alan L. McNab *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 557-568 refs Sponsored in part by Navy and NSF (For primary document see N79-27543 18-42)
(Grants DAAG29-76-G-0157; EPA-R-800397)
Avail: NTIS HC A99/MF A01

N79-27592# Dames and Moore, Atlanta, Ga.
RECEPTOR GRID SELECTION IN MODEL EVALUATION STUDIES TO COMPENSATE FOR UNCERTAINTY IN WIND DIRECTION SPECIFICATION
Paul D. Gutfreund *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 569-582 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27593# Wien Univ. (Austria).
METEOROLOGICAL INPUT DATA FOR THE VIENNA DISPERSION MODEL
Helga Kolb *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 583-602 refs (For primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

N79-27596# Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Environmental Planning.
VERTICAL CHANGES IN STABILITY CONDITIONS WITHIN THE FIRST 100 METERS: TENNESSEE VALLEY
George W. Reynolds *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the Ninth Intern. Tech. Meeting on Air Pollution Modeling and its Appl. 1978 p 625-636 refs (For

primary document see N79-27543 18-42)
Avail: NTIS HC A99/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N79-27801 Miami Univ., Coral Gables, Fla.
A NUMERICAL MODEL OF ACOUSTIC FLUCTUATIONS FOR SINGLE- AND PAIRED-PATH TRANSMISSIONS IN REAL AND CANONICAL OCEANS Ph.D. Thesis
Ricky Tsun-Pong Leung 1978 106 p
Avail: Univ. Microfilms Order No. 7911797

A numerical model is developed to study the statistics of single-and paired-path transmissions in real and canonical oceans. Internal gravity waves are assumed to be playing a dominating role in sound-speed fluctuations. Normal mode solutions can well represent internal waves in the deep ocean. These modes are normalized with the Garrett-Munk internal wave energy spectrum. In the calculations of the strength parameter and the diffraction parameter, they are found to be sensitive not only to the stratification but also to the ray geometries. The acoustic phase-rate spectrum is investigated along with its transition from single-path to multi-path statistics. Numerical results give understanding of the spectral shape and the magnitude of acoustic fluctuations. Dissert. Abstr.

N79-27802 North Carolina State Univ. at Raleigh.
THE EFFECT OF AN ARBITRARY TOPOGRAPHY ON COMPRESSIBLE, STABLY STRATIFIED, VERTICALLY SHEARED FLOW ON THE BETA PLANE Ph.D. Thesis
David Martin Rooney 1978 92 p
Avail: Univ. Microfilms Order No. 7915545

A double integral perturbation pressure function describing the streamline distribution of vertically sheared, stably stratified compressible flow over a topographic feature was solved by the method of residues. By comparing the solution with that for unsheared flow, it was found that by increasing the shear in the upstream flow a wave with a smaller amplitude and greater wavelength than the wave in unsheared flow (either with the same base velocity or with equivalent kinetic energy to the sheared flow) is produced. In addition, the vertical variation of the downstream wave was determined to be negligible for all cases considered. By superposing Green's function solutions, a realistic simulation of the Rocky Mountains and the Andes Mountains was achieved. A simplistic oceanic application verified that perturbations in the Gulf Stream can be topographically induced. Dissert. Abstr.

N79-27803 Illinois Univ. at Urbana-Champaign.
THE DIGITAL SIMULATION OF AREAL SALT TRANSPORT TO EVALUATE WATER MANAGEMENT PROPOSALS IN A COASTAL AQUIFER Ph.D. Thesis
Robert Wray Andrews 1979 226 p
Avail: Univ. Microfilms Order No. 7915314

The areal and temporal variations in head, velocity, and concentration within a large coastal aquifer in northwestern Mexico were evaluated to assess the effect changes in discharge will impose on the concentration distribution. The field area studied was the Costa de Hermosillo, Sonora, which borders the Gulf of California in the Sonoran Desert physiographic province of Mexico. The Costa de Hermosillo aquifer is being actively intruded by saltwater as a result of the lowering of the piezometric surface corresponding to annual withdrawals far exceeding the natural recharge. An accurate hydrologic and water quality simulation model was developed based on the Galerkin weighted residual finite element method. The known hydrologic conditions are reproduced as a means of calibrating the model. The solution is subsequently extended into the future in order to ascertain the relative effects each of the proposed management alternatives will produce on the salt distribution. Dissert. Abstr.

N79-27804 Columbia Univ., New York.
SHAPE OF THE OCEAN SURFACE AND IMPLICATIONS FOR THE EARTH'S INTERIOR Ph.D. Thesis
Michael Edward-Dewey Chapman 1979 210 p
Avail: Univ. Microfilms Order No. 7916393

For purposes of geological interpretation, techniques are developed to directly compute the geoid anomaly over models of density within the Earth. Ideal bodies such as line segments, vertical sheets, and rectangles are first used to calculate the geoid anomaly. Realistic bodies are modeled with formulas for two dimensional polygons and three dimensional polyhedra. Using Fourier transform methods the two dimensional geoid is seen to be a filtered version of the gravity field, in which the long wavelength components are magnified and the short wavelength components diminished. Dissert. Abstr.

N79-27805 Oregon State Univ., Corvallis.
A BIOGEOCHEMICAL STUDY OF MANGANESE IN THE ESTUARINE ZONE Ph.D. Thesis
Arthur Russell Flegal, Jr. 1979 136 p
Avail: Univ. Microfilms Order No. 7916639

Topics covered include: (1) labelling the manganese in geochemical samples by neutron activation; (2) the elemental affinity of the suspended particulates, fine bottom sediments and benthic invertebrate fecal pellets of the Alsea River, Oregon; and (3) phase transformations of manganese under simulated estuarine conditions. Dissert. Abstr.

N79-27806*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A COMPARISON OF SIMULATED AND EXPERIMENTAL WAVE SPECTRA IN THE NEARSHORE REGION M.S. Thesis - Old Dominion Univ.
W. Douglas Morris 1979 89 p refs
(NASA-TM-80478) Avail: NTIS HC A05/MF A01 CSCL 08C

The results of comparing the experimental spectra measured over the shelf with spectra measured in deepwater conditions indicated that statistically significant changes occurred over the shelf region that could be attributed to shoaling and refraction effects. The comparison of the simulated spectra with the experimental agreed well at the 80% confidence level for all but the most inshore data segment. The total energy also showed similar agreement. However, the theoretical frequency at which peak spectral density occurred did not follow the decreasing trend seen in the experimental data. Guidelines are proposed for determining the type wavefield to which the modeling technique can best be applied, and caution is given on the selection of the digitization rate necessary to ensure sufficient detail for analysis of wave data. Author

N79-27807*# California Inst. of Tech., Pasadena. Seismological Lab.
TIME-DEPENDENT GRAVITY IN SOUTHERN CALIFORNIA, MAY 1974 - APR 1979
James H. Whitcomb, Wolfgang O. Franzen, Jeffrey W. Given, James C. Pechman, and Larry J. Ruff Apr. 1979 41 p refs (Grant NsG-5224)
(NASA-CR-158765) Avail: NTIS HC A03/MF A01 CSCL 08N

Gravity measurements were coordinated with the long baseline three dimensional geodetic measurements of the Astronomical Radio Interferometric Earth Surveying project which used radio interferometry with extra-galactic radio sources. Gravity data from 28 of the stations had a single reading standard deviation of 11 microgal which gives a relative single determination between stations a standard deviation of 16 microgal. The largest gravity variation observed, 80 microgal, correlated with nearby waterwell variations and with smoothed rainfall. Smoothed rainfall data appeared to be a good indicator of the qualitative response of gravity to changing groundwater levels at other suprasediment stations, but frequent measurement of gravity at a station was essential until the quantitative calibration of the station's response to groundwater variations was accomplished. R.E.S.

N79-27808# Argonne National Lab., Ill.
COMPARISON OF MODEL AND OBSERVED NEARSHORE CIRCULATION
J. H. Allender, J. D. Ditmars, W. Harrison, and R. A. Paddock 1978 20 p refs Presented at 16th Intern. Conf. on Coastal Eng., Hamburg, Aug. 1978

(Contract W-31-109-eng-38)
(ANL/EES-CP/22; Conf-780887-1) Avail: NTIS HC A02/MF A01

Results from a two-dimensional numerical model for near-shore circulation induced by waves and wind are compared with observations made during two storms at a beach on Lake Michigan. Model input data include bathymetry, offshore wave characteristics, wind histories, and local water level changes. The predicted locations of the breaker zone are in rough accord with those observed during the storms. Data for comparison with model results consist of wave and current observations across the surf zone, especially those acquired by using a towed, instrumented sled. The model often predicts peak currents near the breaker zone, but underestimates the decay of wave height and the strength of longshore currents across the surf zone. Wave breaking on the bar trough beach structure prevalent in this study is not well represented by the model. DOE

N79-27809# Danish Meteorological Inst., Copenhagen.
OCEANOGRAPHICAL OBSERVATIONS FROM DANISH LIGHT-VESSELS AND COASTAL STATIONS
1976 105 p
(ISBN-87-7478-151-0) Avail: NTIS HC A06/MF A01

Data is presented in tabular form on current direction and speed as well as on sea water temperature and salinity off the coast of Denmark in the North and Baltic seas. Author (ESA)

N79-27810# Centre Oceanologique de Bretagne, Brest (France).
THE SEA-BEAM: A MULTI-BEAM ECHO-SOUNDER INSTALLED ON THE OCEANOGRAPHIC SHIP 'JEAN CHARCOT' [LE SEA-BEAM, SONDEUR A FAISCEAUX MULTIPLES DU NAVIRE OCEANOGRAPHIQUE 'JEAN-CHARCOT']
Jean-Paul Allenou and Vincent Renard Paris Centre Natl. pour l'Exploit. des Oceans 1978 29 p In FRENCH; ENGLISH summary
(CNEXO-STR-37; ISSN-0339-2899) Avail: NTIS HC A03/MF A01

The main characteristics as well as an evaluation of the performance and potential of the system are discussed. The multiple beam echo-sounder acquires data over a swath of the sea floor over which the ship is sailing. In depths of 4000 m, the width of the covered area is over 3000 m. A real time batimetric contour plot is produced. Initial sea trials, conducted in May and June 1977, confirm the validity and the potential of the multi-beam echo sounder. The main technical characteristics of the SEA-BEAM are described. Author (ESA)

N79-27811# National Marine Fisheries Service, Seattle, Wash.
EXPENDABLE BATHYTHERMOGRAPH OBSERVATIONS FROM NMFS/MARAD SHIP OF OPPORTUNITY PROGRAM FOR 1976
Steven K. Cook, Barclay P. Collins, and Christine S. Carty Jan. 1979 102 p refs
(PB-294215/9; NOAA-TR-NMFS-SSRF-727; NOAA-79031612) Avail: NTIS HC A06/MF A01 CSCL 08J

The results of the fifth year of operation of the NMFS/MARAD Ship of Opportunity Program (SOOP) are shown. The data are presented in the form of vertical distributions of temperature and horizontal distributions of sea surface temperature and salinity. Operational and data management procedures are discussed, and a descriptive analysis of the most dynamic transects showing the Yucatan, Loop, Florida, and Gulf Stream current systems is presented. The annual development and subsequent degradation of the cold cell off the Middle Atlantic Bight is also discussed. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N79-27812 Illinois Univ. at Urbana-Champaign.
DOSE-EFFECT RELATIONSHIPS FOR ULTRASOUND IRRADIATION OF BRAIN TISSUE Ph.D. Thesis
Ronald Lee Johnston 1979 92 p
Avail: Univ. Microfilms Order No. 7915373

A series of experimental animals were irradiated using high-intensity focused ultrasound in the frequency range from 1 to 7 MHz to produce irreversible structural alterations in brain tissue (surgical focal lesions). A dose-effect relationship was demonstrated to exist between the calculated absorbed energy per unit volume, and the volume of the produced lesions as measured on histologyically prepared tissue sections. It was also shown that equal size lesions, produced at a given dose-rate or intensity, were obtained at two different ultrasound irradiation frequencies by equivalent values in absorbed dose. Another series of experiments were conducted to study the effects of the superior brain meninges (dura mater, anrachnoid membrane, and pia mater) on the propagation of ultrasound to investigate the apparent frequency dependence, over the range of 1 to 9 MHz, in the minimum irradiation exposure required for the just discernable appearance of a brain lesion as evidenced by subsequent histological preparation and optical microscopy (an apparent threshold phenomenon). Dissert. Abstr.

N79-27813 Illinois Univ. at Urbana-Champaign.
APPLICATIONS OF CHLOROPHYLL FLUORESCENCE TRANSIENT MEASUREMENTS TO THE FUNCTIONAL ANALYSIS OF PHOTOSYNTHETIC PROCESSES Ph.D. Thesis
John Robert Lieberman 1979 84 p
Avail: Univ. Microfilms Order No. 7915384

Chlorophyll fluorescence transient measurements are recognized as a means of detecting damage to photosynthetic processes in intact plants. The technique is attractive because data collection is easy, fast, nondestructive, and can be done in the field. The potential applications may extend to its use as a diagnostic tool in plant pathology and a screening tool in plant genetics. New information on the role of the light-harvesting complex (LHC) in regulating fluorescence levels is described. Fluorescence transient measurements are used in identifying the primary site of injury in soybean leaves afer illumination at chilling temperature, and in determining the range of environmental conditions under which this injury occurs. Dissert. Abstr.

N79-27814*# Alabama A & M Univ., Normal.
PREPARATION OF GUINEA PIG MACROPHAGE FOR ELECTROPHORETIC EXPERIMENTS IN SPACE Final Report
May 1979 43 p refs
(Grants NsG-8062; NsG-8064)
(NASA-CR-158777) Avail: NTIS HC A03/MF A01 CSCL 06C

Methods of storage and cultivation of macrophage cells in preparation for space experiments were investigated. Results show that freezing and thawing immediately after extraction did not cause any change in viability or electrophoretic mobility of the cells. A prolonged storage at -80 C did cause cell damage as indicated by a 95% reduction in variable cells. Cell damage was decreased when Glycerol or Dimethyl Sulfoxide (DMSO) was added as a cryogenic protective agent. A 100% viability was observed in cultivation experiments after two weeks due to the additional serum. Results from gamma-glutamyl transpeptidase study showed a zero activity rate. It is suggested that a flat stationary field be used for the collection and use of macrophage. It was found that a 24-hour delay in obtaining macrophage cells helps to maintain a pure culture. G.Y.

N79-27815*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
MICROBIAL LOAD MONITOR Final Report
S. F. Gibson and E. R. Royer 30 Jun. 1979 224 p refs
(Contract NAS9-11877)
(NASA-CR-160274; MDC-E1879) Avail: NTIS HC A10/MF A01 CSCL 06B

The Microbial Load Monitor (MLM) is an automated and computerized system for detection and identification of microorganisms. Additionally, the system is designed to enumerate and provide antimicrobic susceptibility profiles for medically significant bacteria. The system is designed to accomplish these tasks in a time of 13 hours or less versus the traditional time of 24 hours for negatives and 72 hours or more for positives usually required for standard microbiological analysis. The MLM concept differs from other methods of microbial detection in

that the system is designed to accept raw untreated clinical samples and to selectively identify each group or species that may be present in a polymicrobic sample. G.Y.

N79-27816# Missouri Univ. - Columbia. Dept. of Civil Engineering.

EFFECT OF PHOSPHORUS SUPPLY ON ALGAL BIOMASS IN A TURBID MISSOURI RESERVOIR

John T. Novak, John Jones, Catherine Crisp, Norman Crisp, and Fred Cunningham Mar. 1979 113 p refs

(Contracts DI-14-34-0001-7053; DI-14-34-0001-7054)

(PB-293183/0; W79-05001; OWRT-A-095-MO(1)) Avail: NTIS HC A06/MF A01 CSCL 13B

The relationship between primary productivity and phosphorus levels in the Lake of the Ozarks was determined. Data obtained suggest that inorganic phosphorus entering the Lake of the Ozarks may not have as great an impact on productivity as point source inputs. Productivity was limited because of the high flushing rates in the lake and because of limited availability of bound phosphorus. The data further indicated that light availability may not be as important in turbid man made reservoirs as the impact of silt on phosphorus availability. GRA

N79-27817# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, V. 13, NO. 3, 1979

29 Jun. 1979 143 p refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 143 p (JPRS-73784) Copyright. Avail: NTIS HC A07/MF A01

Articles are presented concerning the selection and training of cosmonauts; evaluation and analysis of accumlated data to facilitate the on-going transition from orbital to interplanetary flights; research aimed at guaranteeing safety on long flights and reliability of the human component of the man-spaceship system; space psychology and physiology; environmental problems and control; (spacecraft habitability, effects of radiation and weightlessness, etc.) and telemetry. For individual titles, see N79-27818 through N79-27835.

N79-27818# Joint Publications Research Service, Arlington, Va.

HELIUM-OXYGEN MIXTURE AND THE ORGANISM HYPERBARIC ASPECT **c54**

L. G. Ogorodnikova *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 1-14 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 3-10 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

A review of publications discussing the effect of hyperbaric He-O2 atmosphere demonstrates that its effect on the human body depends primarily on its physical parameters, density and heat conductance. Another specific effect of the atmosphere, its narcotic effect at increased pressures used in diving, still remains poorly documented. However, it appears a well recognized fact that the specific effect can be seen only in the transition period, i.e. during compression. Author

N79-27819# Joint Publications Research Service, Arlington, Va.

SIMULATION OF FLUID-ELECTROLYTE METABOLISM AS A MEANS OF PREVENTING ORTHOSTATIC INSTABILITY IN THE CREW OF THE SECOND EXPEDITION ABOARD THE SALYUT-4 STATION **c52**

O. G. Gazenko, A. I. Grigor'yev, V. A. Degtyarev, L. I. Kakurin, G. I. Kozyrevskaya, N. A. Lapshina, Yu. V. Natochin, I. P. Neumyvakin, A. S. Nekhayev, and A. A. Savilov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 15-20 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 10-15 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

The water-salt supplement developed in ground-based experiments in order to increase human tolerance to LBNP (lower body negative pressure) and orthostatic tests was recommended to be given to the crewmembers of the final stage of the second expedition of Salyut-4. On the 53rd flight day, concomitantly with an intake of 4.0 g sodium chloride and 900-1200 ml water, an LBNP test was carried out to assess the effectiveness of this supplement, to select its optimal doses and to clarify individual responses. After the intake both cos nonauts showed a better tolerance of the LBNP test. They also displayed individual variations in their responses. Both cosmonauts were requested to take 9.0 g sodium chloride and 1000-1200 ml water on the last flight day. The postflight examinations demonstrated that the countermeasures applied (physical exercises, LBNP) in combination with the direct action on the fluid-electrolyte metabolism gave a pronounced positive effect. Author

N79-27820# Joint Publications Research Service, Arlington, Va.

INVESTIGATION OF ALBUMIN AND GLOBULIN COMPOSITION OF BLOOD OF THE CREW OF THE SALYUT-3 ORBITAL STATION **c52**

Ye. V. Guseva and R. Yu. Tashpulatov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 21-25 ref Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 15-18 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

Postflight changes in the blood protein composition involving albumin and globulin fractions with the predominant increase of most globulin fractions and an increase of total protein were noted. These changes were adaptive. The content of gamma-globulin fractions returned to the normal within a comparatively short period of time (four days postflight). A complete recovery of the changes in the protein composition of blood required a longer period of time. Author

N79-27821# Joint Publications Research Service, Arlington, Va.

THE COMBINED EFFECT OF SPACE FLIGHT FACTORS AND RADIATION ON RAT SKELETAL MUSCLES

Ye. I. Il'ina-Kakuyeva and V. V. Portugalov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 26-32 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 19-24 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

A prolonged irradiation of rats at a dose of 800 rad on their 10th day of flight aboard the biosatellite Cosmos-690 aggravated the severity of weightlessness and hypokinesia-induced atrophic and dystrophic processes in the soleus muscle and the atrophic process in the gastrocnemius muscle. Radiation exposure altered the pattern of reparation in the areas of the soleus muscle that developed pathological changes and delayed resorption which occurred during the pathological process of the connective tissue, which resulted in an inhibition of the reparation process. Author

N79-27822# Joint Publications Research Service, Arlington, Va.

CATECHOLAMINES AND ENZYMES OF METABOLISM THEREOF IN THE RAT HYPOTHALAMUS AFTER FLIGHT ABOARD COSMOS-782 BIOSATELLITE

R. Kvetnyanski, R. A. Tigranyan, T. Torda, D. Babushikova, Ye. Yaknova, N. F. Kalita, and M. Vigash *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 33-37 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 24-27 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

The concentration of catecholamines, and activity of enzymes involved in their synthesis (tyrosine hydroxylase and dopamine-beta-hydroxylase) and degradation (monoamine oxidase) were measured in the hypothalamus of rats flown for 19.5 days aboard the biosatellite Cosmos-782, synchronous and vivarium controls sacrificed on R + O and R + 25 days. No significant changes in the above parameters of the flight rats were found. The findings give evidence that a prolonged space flight induces no changes in the content, synthesis or degradation of catecholamines in the rat hypothalamus. This seems to indicate that weightlessness does not act as an acute stressor. Author

N79-27823# Joint Publications Research Service, Arlington, Va.

TISSULAR METABOLISM IN MIXED TYPE FIBERS OF RAT SKELETAL MUSCLES AFTER FLIGHT ABOARD COSMOS-690 BIOSATELLITE

M. S. Gayevskaya, R. A. Belitskaya, N. S. Kolganova, Ye. V. Kolchina, L. M. Kurkina, and Ye. A. Nosova *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 38-42 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 28-31 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

On the R + O day the quadriceps muscle of rats showed a decrease in the content of T protein and an inhibition of LDH (lactic dehydrogenase) activity of sacroplasmatic proteins. These changes resulted from the combined affect of space flight factors and gamma-irradiation, and may be considered as a decline of compensatory synthetic processes responsible for the recovery of muscle proteins in weightlessness. Inhibition of the age-associated shift of the M:H ratio of LDH found on the R + 25 day can be attributed to the inhibitory effect of gamma irradiation. No change in the content of glycogen in the gastrocnemius muscle of flight rats was noted. Author

N79-27824# Joint Publications Research Service, Arlington, Va.

IMMUNOLOGICAL REACTIVITY OF RATS FLOWN ABOARD COSMOS-605 AND COSMOS-690 BIOSATELLITES

A. A. Ivanov and V. N. Shvets *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 43-46 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 31-33 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

Immunological reactivity of rats flown aboard the biosatellites Cosmos-605 and Cosmos-690 was compared with respect to the complementary activity of serum and frequency antibodies to sheep red blood cells. Cosmos-605 rats showed changes that rapidly returned to normal whereas Cosmos-690 rats irradiated inflight with a dose of 800 rad exhibited significant and stable changes in immunological reactivity. Those latter seemed to be associated with the combined effect of ionizing radiation and other space flight factors. Author

N79-27825# Joint Publications Research Service, Arlington, Va.

POSSIBILITIES OF PREVENTING ADVERSE REACTIONS IN SIMULATING THE ACUTE PERIOD OF ADAPTATION TO WEIGHTLESSNESS c52

V. G. Voloshin, V. A. Karpusheva, V. I. Stepantsov, V. S. Panchenko, and B. F. Asyamolov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 47-52 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 33-37 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

It was shown that during head-down tilting at an angle of -30 degrees occlusion of the four limbs by 79 mm Hg relieved unpleasant symptoms. According to rhecencephalography, cerebral blood flow decreased to the level normally seen in the supine position. During a prolonged head-down tilting at an angle of -15 deg intermittent occulsion of only lower limbs by 60-30 mm Hg proved more effective. G.Y.

N79-27826# Joint Publications Research Service, Arlington, Va.

PROBABILITY OF CAISSON DISEASE WHILE WEARING A SPACE SUIT WHEN EXITING FROM A SPACECRAFT WITH AN ATMOSPHERE CLOSE TO THAT OF EARTH c52

A. S. Barer, L. G. Golovkin, S. N. Filipenkov, I. N. Chernyakov, and A. A. Sheykin *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 53-59 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 37-42 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

A large number (550) pressure chamber experiment in which 200 suited subjects simulated an egress from the spacecraft (decompression from 760 to 20-10 mm Hg) showed a relationship between decompression sickness frequency and severity, space suit absolute pressure (160-310 mm Hg), time of the exposure (1-10 hours), and desaturation (15-60 min), and exercise load (150-400 Cal/hr). Without desaturation there were no decompression sickness symptoms at a suit pressure of 270-310 mm Hg. An egress into space in a suit at a pressure of 160-230 mm Hg after 15-60 min desaturation induced bends of different severity. Less frequent cases of decompression sickness in our experiments as compared with the literature data (obtained on unsuited subjects) can be attributed to the peculiar kinematics of movements and excessive pressure in the suit. Author

N79-27827# Joint Publications Research Service, Arlington, Va.

PNEUMOTACHOGRAPHIC DISTINCTIONS OF EXTERNAL RESPIRATION IN MAN IN THE PRESENCE OF EXCESS INTRAPULMONARY PRESSURE ON GROUND LEVEL AND AT HIGH ALTITUDES c52

V. A. Glazkova, I. V. Maksimov, and I. N. Chernyakov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 60-67 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 43-49 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

In 54 pressure chamber experiments, 12 healthy male test subjects took part. Their pneumotachograms and other physiological parameters at a positive pressure breathing of 30 mm Hg at sea level and of 125-130 mm Hg at an altitude of 25,000 m at rest and while exercising were recorded. High altitude facilities and pneumotachograph were modified to meet the experimental requirements. The changes in pneumotachographic readings depended on the excess intrapulmonary pressure, its variations with respect to the respiratory stages, efficiency of the external counterpressure on the body, as well as motor activity of the test subjects. The pneumotachographic procedure allowed qualitative and quantitative evaluations of external respiration upon excess intrapulmonary pressure, and study of the mechanism of these changes supported by other physiological methods. J.A.M.

N79-27828# Joint Publications Research Service, Arlington, Va.

EFFECT OF ACUTE HYPOXIA ON SOME PARAMETERS OF RENAL EXCRETORY FUNCTION AND RENAL HEMODYNAMICS c52

B. G. Zhilis, Ye. F. Kotovskiy, L. S. Uspenskiy, and G. N. Petukhova *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 68-73 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 49-53 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

Diuresis, glomerular filtration, tubular reabsorption (endogenous creatinine clearance), renal blood and plasma flow, total resistance of renal vessels, and filtration fraction were measured in 59 patients with mechanical (strangulation) asphyxia. Asphyxia and resulting hypoxia induced a substantial increase of diuresis, glomerular filtration and a decrease of tubular reabsorption. Disorders of renal hemodynamics which invloved a decrease of renal plasma and blood flow and an increase of total resistance of renal vessels contributed significantly to the mechanism of changes of the renal excretory function. As shown by vasographic and morphological examinations, the state of intrarenal hemodynamics plays the major role in changes of the renal function. J.A.M.

N79-27829# Joint Publications Research Service, Arlington, Va.

TOXICITY OF OXYGEN MIXED WITH HELIUM c52

G. V. Troshikhin and Zh. A. Donina *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 74-80 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 54-58 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

A 3-day exposure of mice to 20%-80% He-O2 environment

at 28-30 C led to an earlier decrease of gas exchange, a faster development of pulmonary inflammatory changes, and an earlier death of the animals as compared with an exposure to similar N2O2 and He-O2 atmospheres at room temperature. The possible role of the indifferent gas in the toxic effect of oxygen on the animal body is discussed. J.A.M.

N79-27830# Joint Publications Research Service, Arlington, Va.

EFFECT OF HYPERBARIC OXYGEN ON PERIPHERAL BLOOD NEUTROPHIL METABOLISM **c52**

L. S. Keyzer *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 81-85 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 58-61 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

The effect of hyperbaric oxygen (1-5 ata for 1 hr) on the activity of cytochrome oxidase, peroxidase, lipid content and phagocytic activity of neutrophils was studied. The dynamics of the recovery of those parameters was followed. A multimodal relationship between the pressure level and changes in the enzyme activity and lipid content was noted. The decrease in the activity of peroxidase was more pronounced than that of cytochrome oxidase in all cases. The dynamics of the recovery of the above parameters was shown to depend on the pressure level. The cytochemical parameters returned to the normal within 24 hours. The decline in the activity of cytochrome oxidase, peroxidase and in the lipid content of peripheral neutrophils was followed by a decrease in the phagocytic activity. These changes were closely correlated. J.A.M.

N79-27831# Joint Publications Research Service, Arlington, Va.

EFFECT OF BRIEF HEAD-DOWN HYPOKINESIA ON PRESSURE IN VARIOUS PARTS OF THE HEALTHY MAN'S CARDIOVASCULAR SYSTEM **c52**

V. Ye. Katkov, V. V. Chestukhin, O. Kh. Zybin, V. M. Mikhaylov, A. Z. Troshin, and V. N. Utkin *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 86-93 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 62-67 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

Before and after 5 day head-down tilting (-4.5 deg) blood pressure was measured in different cardiovascular compartments by the technique of selective catheterization: the upper bulb of the internal jugular vein, superior and inferior venae cavae, hepatic, renal and iliac veins, right atrium and right ventricle, coronary sinus, pulmonary and radial arteries. After exposure the pressure in extrathoracic vessels increased by 1.4 mm Hg on the average: in the internal jugular vein it rose by 1.7 mm Hg whereas in the iliac vein by 1.0 mm Hg. The blood presure in the intrathoracic vessels of the systemic circulation increased, as a rule, by no more than 0.5-0.8 mm Hg. This elevation was characteristic of diastolic regions of the pressure curve (x- and y-collapse). The pressure in pulmonary vessels-pulmonary artery and left atrium-showed a trend for a decrease of 1.3 mm Hg. The factors that may be responsible for the dissimilar changes of pressure in different cardiovascular compartments under the influence of short-term simulated weightlessness are discussed. J.A.M.

N79-27832# Joint Publications Research Service, Arlington, Va.

EVALUATION OF CIRCULATORY REACTIONS IN THE HEAD TO ANTIORTHOSTATIC POSITION **c52**

A. F. Zhernakov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 94-99 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 67-71 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

On the basis of experiments of 122 healthy male test subjects, the norms of reactions of cerebral circulation to antiorthostatic exposures, basic principles, and evaluation of its antiorthostatic tolerance (AOT) were established. The level of AOT was found to increase in acrobats in the course of their training, in test subjects after 30-day head-down tilting, and in space crewmen postflight. This increase can be regarded as an adaptive reaction of cerebral circulation to the excess blood rush to the head both on the Earth and in weightlessness. The similarity of regulatory hemodynamic changes in the above groups shows the possibility and indicates approaches to the ground-based training of cerebral circulation aimed at facilitating and accelerating its adaptation to weightlessness. J.A.M.

N79-27833# Joint Publications Research Service, Arlington, Va.

ANIMAL ENDURANCE TO RECURRENT IMPACT ACCELERATIONS

N. P. Morozova *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 100-105 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 71-75 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

The harmful effect of repeated impact accelerations on the animal body was studied. The dogs were exposed to accelerations one, three, five, or ten times. The experiments showed a cumulative effect of repeated exposures which included a consistent increase of changes in the physiological and morphological parameters. Tolerance to repeated accelerations increased due to better restraint of the animals. J.A.M.

N79-27834# Joint Publications Research Service, Arlington, Va.

CHARACTERISTICS OF PROTEINS OF SOME UNICELLULAR ORGANISMS AS POTENTIAL COMPONENTS OF ECOLOGICAL LIFE SUPPORT SYSTEMS **c54**

V. A. Barashkov, I. N. Trubachev, and I. I. Gitel'zon *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 106-112 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 75-80 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

A comparative characterization of the biological value of proteins from green and blue-green algae, bacteria, and microbial coenosis of straw mineralizing active sludge is given with respect to the fractional composition of total protein, its amino acid composition, and affinity for proteolytic enzymes in vitro. The above microorganisms have an adequate amino acid composition, a high content of essential amino acids, and differ in their content of readily soluble proteins. The presence of protein complexes with other cellular components, for instance lipids and carbohydrates, seems to be responsible for a poor digestibility of these proteins. J.A.M.

N79-27835# Joint Publications Research Service, Arlington, Va.

MORPHOLOGICAL DISTINCTIONS OF THE RAT THYROID AND PARATHYROID FOLLOWING LONG-TERM SPACE FLIGHTS

G. I. Plakhuta-Plakutina *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 113-118 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 80-84 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

Increased excretion of electrolytes (in particular, calcium), decreased mineralization of bone, as well as signs of osteoporosis, were demonstrated in cosmonauts during and after space flights and in animals flown aboard artificial satellites. In view of the fact that the thyroid and parathyroid are involved in regulating calcium metabolism and could play some role in weightlessness in impairment of this form of metabolism, a morphological study was made of these glands in rats that were flown aboard Cosmos-605 and Cosmos-782 satellites. J.A.M.

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N79-27836* National Aeronautics and Space Administration. Pasadena Office. Calif.

APPARATUS AND METHOD OF INSERTING A MICROELECTRODE IN BODY TISSUE OR THE LIKE USING VIBRATION MEANS Patent

Cyril Feldstein (JPL), Donald W. Crawford (JPL), and Evangelyn W. Kanabus, inventors (to NASA) (JPL) Issued 15 May 1979 8 p Filed 6 Aug. 1976 Supersedes N79-24646 (17 - 15, p 2027) Sponsored by NASA
(NASA-Case-NPO-13910-1; US-Patent-4,154,228; US-Patent-Appl-SN-712270; US-Patent-Class-128-329R; US-Patent-Class-128-639) Avail: US Patent and Trademark Office CSCL 06B

An arrangement for and method of inserting a glass microelectrode having a tip in the micron range into body tissue is presented. The arrangement includes a microelectrode. The top of the microelectrode is attached to the diaphragm center of a first speaker. The microelectrode tip is brought into contact with the tissue by controlling a micromanipulator. Thereafter, an audio signal is applied to the speaker to cause the microelectrode to vibrate and thereby pierce the tissue surface without breaking the microelectrode tip. Thereafter, the tip is inserted into the tissue to the desired depth by operating the micromanipulator with the microelectrode in a vibratory or non-vibratory state.

Official Gazette of the U.S. Patent and Trademark Office

N79-27837 Denver Univ., Colo.
THE LOUDNESS OF TINNITUS Ph.D. Thesis
Patricia Earnest Goodwin 1979 192 p
Avail: Univ. Microfilms Order No. 7916119

Tinnitus, a subjective sensation of noise, is a common otological symptom which was estimated to be a complaint of approximately 32% of the adult population of the United States. It was suggested that either the method for the measurement of tinnitus is not valid, or distress is not a function of loudness, or some other factor such as loudness recruitment may be operating. The loudness of tinnitus and what effect recruitment might have on the magnitude of this psychological attribute were examined. Nine adult males with 14 ears displaying tinnitus which could be matched to a pure tone and an audiometric configuration which included at least one frequency with a normal threshold constituted the experimental group. Nine adult males with 14 ears displaying auditory thresholds within normal limits constituted the control group. Dissert. Abstr.

N79-27838 Purdue Univ., Lafayette, Ind.
MAGNITUDE ESTIMATION AS A HEARING AID SELECTION PROCEDURE Ph.D. Thesis
Richard Wood Harris 1978 199 p
Avail: Univ. Microfilms Order No. 7914904

A magnitude estimation procedure for making hearing aid quality judgments was investigated in a sound suite and a reverberant room using ten experienced hearing aid users as subjects. In Experiment 1 the magnitude estimation procedure was compared to a paired comparison quality judgment procedure. In this experiment both procedures were conducted using tape recorded speech which was re-recorded through the experimental hearing aids mounted on KEMAR. Subjects listened to these stimuli through an insert receiver (pseudoaided condition). Experiment 2 considered feasibility, test-retest reliability, and also validity of the magnitude estimation quality judgement procedure and compared magnitude estimation to speech discrimination in quiet and noise. In Experiment 2 speech stimuli were presented in a sound field and processed through hearing aids worn by the subjects. Dissert. Abstr.

N79-27839 California Univ., San Francisco.
FUNCTIONAL CONNECTIONS OF THE CENTRAL AUDITORY NERVOUS SYSTEM: THALAMOCORTICAL CORTICOTHALAMIC AND CORTICOTECTAL CONNECTIONS OF THE AI, AII AND AAF AUDITORY CORTICAL FIELDS Ph.D. Thesis
Richard Alan Anderson 1979 264 p
Avail: Univ. Microfilms Order No. 7913231

The connections of the three auditory fields AI, AII and the anterior auditory field (AAF) and the inferior colliculus were studied using anterograde and retrograde tracing techniques. Microinjections of tracers were placed at physiologically indentified loci after these fields were functionally mapped with the microelectrode recording technique. This ensured that the injections were well within the borders of each cortical field that was studied and enabled the elucidation of the topographies of connections of AAF and AI concerning their cochleoptopic organizations. Dissert. Abstr.

N79-27840 California Univ., Berkeley.
BIOLOGICAL EFFECTS OF LASER IRRADIATION ON NERVE CELLS Ph.D. Thesis
James Edwin Olson 1978 183 p
Avail: Univ. Microfilms Order No. 7914722

Focused laser radiation was used to produce functional changes in neurons from neonatal rat cerebellum in tissue culture. The rate of spontaneous activity was found to decrease and the stimulation threshold to extracellular current injection was found to increase after a single laser pulse. Quantitatively the same responses were observed if the laser energy was delivered to the cell in two or more pulses separated by an interval of several minutes. The sensitivity of the neurons increased with shorter wavelength laser irradiation over the range 685 nm to 490 nm. Parallel electron microscope experiments revealed that the mitochondria are damaged at energy levels which leave other structures intact. Higher laser energy densities resulted in more general cytoplasmic damage. This included enlarged endoplasmic reticulum and vacuolization of the cytoplasm. Dissert. Abstr.

N79-27841 Illinois Univ. at Chicago Circle, Chicago.
REFINEMENT AND VALIDATION OF A MATHEMATICAL MODEL OF THE HUMAN TORSO Ph.D. Thesis
Eberhardt Privitzer 1979 141 p
Avail: Univ. Microfilms Order No. 7916378

Model studies were presented which compared the response of the simplified spine model to vertical dynamic input through the seat to the response of human subjects obtained during two drop tower tests. The simplified spine model was able to reproduce the human response quite well. The effect of the nonlinear behavior of the seat on the model's response was demonstrated in these studies. A study was also presented which compared the responses of the simplified and more complex spine models during a fast onset + 10 G sub z acceleration ejection simulation. The simplified spine model was able to reproduce the overall motion and internal force response of the complex models with a substantial savings of computational effort indicating that it may be well suited for design use.

Dissert. Abstr.

N79-27842 Illinois Univ. at Chicago Circle, Chicago.
CHARACTERIZATION OF CARDIOVASCULAR FUNCTION BY AUTOMATED MONITORING OF CARDIAC CONTRACTILITY AND LEFT VENTRICULAR WALL MOTION ACTIVITY Ph.D. Thesis
Stuart Gordon Abrams 1979 217 p
Avail: Univ. Microfilms Order No. 7916371

An image processing approach was integrated with hemodynamic and temporal interval data analysis in order to investigate the usefulness of left ventricular epicardial border motion tracking. Results demonstrated that the discrete temporal phases of the cardiac cycle were well defined by various motion features contained within the analog waveform generated by continuous cardiac silhouette boundary detection via fluoroscopy. Automated image based measurements of wall velocity during the ejection phase were also shown to be similar to contractile element velocity alterations. As a consequence, early systole wall motion activity appears to reflect accurately the changes in cardiac muscle fiber shortening speed seen earlier in the isovolumic phase.

Dissert. Abstr.

N79-27843# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
PHYSIOLOGICAL FLUID DYNAMICS
Feb. 1971 122 p refs Lecture held at Rhode-Saint Genese, Belgium, 8-12 Feb. 1971
(VKI-Lecture-Series-32) Avail: NTIS HC A06/MF A01

Lectures are presented on the following topics: (1) mechanics of mammalian lung; (2) respiration; (3) mechanics of arterial blood flow; (4) mechanics of microcirculation; (5) mass transport

in arteries; (6) pulmonary circulation and microcirculation; (7) techniques of measurement; and (8) the human micro-environment. For individual titles, see N79-27844 through N79-27851.

N79-27844# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.
MECHANICS OF MAMMALIAN LUNG
D. Glaister *In* Von Karman Inst. for Fluid Dyn. Physiol. Fluid Dyn. Feb. 1971 12 p refs (For primary document see N79-27843 18-52)
Avail: NTIS HC A06/MF A01
The mechanics of the mammalian lung and the chest wall are discussed. G.Y.

N79-27845# Imperial Coll. of Science and Technology, London (England).
RESPIRATION
R. C. Schroter *In* Von Karman Inst. for Fluid Dyn. Physiol. Fluid Dyn. Feb. 1971 16 p refs (For primary document see N79-27843 18-52)
Avail: NTIS HC A06/MF A01
The following topics are discussed: (1) the upper and lower respiratory tract; (2) the pattern of breathing; (3) flow in the upper respiratory tract; (4) flow in the tracheo-bronchial tree; (5) inspiratory and expiratory flow; and (6) gas transport within the respiratory system. G.Y.

N79-27846# Imperial Coll. of Science and Technology, London (England).
MECHANICS OF ARTERIAL BLOOD FLOW
T. J. Pedley *In* Von Karman Inst. for Fluid Dyn. Physiol. Fluid Dyn. Feb. 1971 14 p refs (For primary document see N79-27843 18-52)
Avail: NTIS HC A06/MF A01
The following topics are discussed: (1) description of the arterial system; (2) the propagation of waves in a fluid filled elastic tube; (3) oscillatory viscous flow in a rigid tube; and (4) the attenuation and dispersion of waves (modification of theory). G.Y.

N79-27847# Imperial Coll. of Science and Technology, London (England).
MECHANICS OF THE MICROCIRCULATION
T. J. Pedley *In* Von Karman Inst. for Fluid Dyn. Physiol. Fluid Dyn. Feb. 1971 14 p refs (For primary document see N79-27843 18-52)
Avail: NTIS HC A06/MF A01
Microcirculation, for the purpose of this lecture, was defined as that part of the circulation in which blood vessels have a diameter of less than 100 microns. The important physical properties of microcirculation are outlined. The following topics are discussed: (1) the flow of suspensions in fairly narrow tubes; and (2) the flow of blood in capillaries. G.Y.

N79-27848# Imperial Coll. of Science and Technology, London (England).
MASS TRANSPORT IN ARTERIES
C. G. Caro *In* Von Karman Inst. for Fluid Dyn. Physiol. Fluid Dyn. Feb. 1971 3 p (For primary document see N79-27843 18-52)
Avail: NTIS HC A06/MF A01
A brief discussion on mass transfer in arteries is given. G.Y.

N79-27849# Imperial Coll. of Science and Technology, London (England).
PULMONARY CIRCULATION AND MICROCIRCULATION
c32
C. G. Caro *In* Von Karman Inst. for Fluid Dyn. Physiol. Fluid Dyn. Feb. 1971 4 p refs (For primary document see N79-27843 18-52)
Avail: NTIS HC A06/MF A01
Blood flow in pulmonary circulation and in microcirculation including the lung is discussed. G.Y.

N79-27850# Imperial Coll. of Science and Technology, London (England).
TECHNIQUES OF MEASUREMENT
W. A. Seed *In* Von Karman Inst. for Fluid Dyn. Physiol. Fluid Dyn. Feb. 1971 25 p refs (For primary document see N79-27843 18-52)
Avail: NTIS HC A06/MF A01
The following topics are discussed: (1) catheter techniques - pressure measurement, frequency-content of pressure waveforms, manometer behavior, assessment of system response; (2) flow and velocity measurement in the circulation - time average and instantaneous measurements, electromagnetic flowmeters, anemometry; and (3) measurements in the respiratory system. G.Y.

N79-27851# City Univ., London (England).
THE HUMAN MICRO-ENVIRONMENT
R. N. Cox *In* Von Karman Inst. for Fluid Dyn. Physiol. Fluid Dyn. Feb. 1971 33 p refs (For primary document see N79-27843 18-52)
Avail: NTIS HC A06/MF A01
It is sometimes stated that the skin is surrounded by a layer of still air. However, because the body temperature is normally higher than that of the surroundings, the air next to it becomes warmed and rises due to its buoyancy. The body is thus surrounded by a layer of rising heated air, the natural convection boundary layer. In still air conditions, the natural convection boundary layer forms the inter facial region between the skin surface and its surroundings. This region constitutes the human microenvironment. Within it rapid adjustments of temperature and of humidity take place, and it also plays a role in transporting small particles, such as dust, pollens, skin scales and bacteria. The layer becomes modified by any relative movement between the body and the surroundings, and, for instance by the presence of clothing. G.Y.

N79-27852*# SRI International Corp., Menlo Park, Calif. Life Sciences Div.
STUDY OF PHARMACEUTICAL INDUSTRIAL PROBLEMS
Final Report
Jack H. Pincus Jul. 1979 24 p refs
(Contract NAS9-15463; SRI Proj. LSU-6910)
(NASA-CR-160267) Avail: NTIS HC A02/MF A01 CSCL 06O
The growth of a human colon carcinoma cell line (SK-CO-1) and its production of carcinoembryonic antigen (CEA) in monolayer culture and on single layers of glass beads in unit gravity were evaluated. The limitations of using a microsphere-cell growth system in unit gravity were identified and how these may be overcome in space was considered. The project had the following tasks: (1) growth of cultured human colon carcinoma cells on a monolayer and CEA production; (2) evaluation of CEA production and release by SK-CO-1 cells grown on glass beads; (3) evaluation of other microcarriers for growing SK-CO-1 cells and determination of the minimum amount of culture medium needed for cell growth; and (4) growth of SK-CO-1 cells on collagen monolayers and CEA production. G.Y.

N79-27853# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
ACCEPTABLE RADIATION LEVELS IN THE ULTRAVIOLET VISIBLE INFRARED REGIONS [AANVAARDBARE STRALINGSNIVEAUS IN HET ULTRAVIOLETTE, ZICHTBARE EN INFRARODE STRALINGSGEBIED]
J. J. Vos 1978 80 p refs In DUTCH
(Contract A72/KL/057)
(IZF-1978-15; TDCK-70084) Avail: NTIS HC A05/MF A01
After an introduction to the main harmful effects of electromagnetic radiation in the wavelength range of 100 nm to 1 mm on the skin and eye, acceptable radiation levels are postulated on the basis of experimental data. The burning of the retina, mainly in the wavelength range of 380 to 1370 nm is reported along with sunburn, skin cancer, cornea and conjunctiva inflammation in the wavelength range of 200 to 400 nm. The burning of the skin and cornea in the wavelength range from 1.37 micron to 1 mm is also reported. A total review is given in which the risks of different types are weighed against each other. A definition is given of the micrometer range, and the types of harmful effects are described. The need is expressed for the determination of an acceptable radiation level. F.O.S.

N79-27854# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

ESR STUDIES ON DIFFERENT PATHOLOGICAL STATES

P. L. Indovina 24 Sep. 1977 19 p refs Presented at 12th Paterson Symp., Manchester, Engl., 26-27 Sep. 1977

(ISS-L-22/9) Avail: NTIS HC A02/MF A01

A lecture given at the Cristie Hospital and Holt Radium Institute during the '12th Paterson Symposium' (Manchester 1977, 26-27 September) is presented. ESR measurements on two serum proteins in non-malignant human diseases are discussed. Results are reported for the structure and concentrations of the two serum proteins in different pathological states; that is myocardial infarction, idiopathic pulmonary haemosiderosis, thalaessemia major, and Wilson's disease. The probable diurnal variation of iron transferrin and caeruloplasmin levels is also discussed. Author (ESA)

N79-27855# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazoni.

PROBLEMS RELATED TO THE ASSESSMENT OF SAFE EXPOSURE LEVELS FOR RADIO FREQUENCY AND MICROWAVE RADIATION [PROBLEMI DI NORMATIVA LEGATI ALL'ESPOSIZIONE A RADIOFREQUENZE E MICROONDE]

M. Grandolfo 9 Jun. 1978 17 p refs In ITALIAN; ENGLISH summary

(ISS-P-78/7) Avail: NTIS HC A02/MF A01

A brief survey of safe exposure limits for microwaves and health surveillance of workers as proposed in various countries by the agencies responsible for the prevention of industrial health risks, with emphasis on the systems adopted in the U.S., U.R.S.S., and Poland is presented. Italian activities are presented and compared with those at the international level (WHO, EEC). Author (ESA)

N79-27856# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

THE EFFECT OF A RECLINED SITTING POSITION ON PSYCHOMOTOR PERFORMANCE DURING EXPOSURE TO HIGH, SUSTAINED +Gsub z ACCELERATION

D. H. Glaister and B. J. Lisher Jul. 1977 26 p refs

(FPRC-1362; BR66666) Avail: NTIS HC A03/MF A01

By use of a two-axis adaptive tracking task, psychomotor performance was measured in 12 subjects (6 of them pilots) at up to 8g, either seated in a conventional ejection seat, or reclined with the back supported 60 deg from the vertical in order to determine the influence of seat back angle on pilot in-flight performance. Subjects wore anti-g suits and pressure breathed during acceleration. Reclination led to an improvement in performance at 6g and 8g, the benefit being equivalent to between 1 and 2g. Heart rates were reduced by reclination, the average rate recorded at 8g when reclined being similar to that at 5g when seated conventionally. Author (ESA)

N79-27857# Royal Air Force Inst. of Aviation Medicine, Farnborough (England). Royal Airforce Inst. of Aviation Medicine.

THE EFFECT OF ACCELERATION AND SEAT BACK ANGLE ON PERFORMANCE OF A REACTION TIME TASK

B. J. Lisher and D. H. Glaister Mar. 1978 18 p refs

(FPRC-1364; BR66668) Avail: NTIS HC A02/MF A01

The performance of a complex choice reaction time task was studied with reference to various acceleration levels and three seat back angles. The maximum acceleration levels reached were determined by the subjects themselves. The seat back angles were 17 deg, 52 deg, and 67 deg from the vertical. Results show that performance is not affected at acceleration levels up to and including 6g in any seat. Above this level of acceleration, performance in both the 17 deg and the 52 deg seats deteriorates rapidly. In the 67 deg seat a similar effect is seen, but at a level of acceleration some 1.4g higher than in either of the other postures. It is concluded that only a large angle of supination (i.e. 67 deg from the acceleration vector) will be a sound basis for a high acceleration cockpit. Author (ESA)

N79-27858# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).

THE INFLUENCE OF SEAT BACK ANGLE ON ACCELERATION TOLERANCE

D. H. Glaister Mar. 1978 20 p refs

(FPRC-1365; BR66667) Avail: NTIS HC A02/MF A01

Published data on acceleration tolerance and protection was reviewed. The influence of seat back angle on g-tolerance was found to be well described by the equation, tolerance = a + b/cos alpha, where alpha is the angle between seat back and G-vector. This relationship was found to hold good for relaxed unprotected subjects as well as for those wearing anti-g suits, or fully protected by anti-g suit, breathing maneuvers and muscle tensing. Best-fit regressions predicted that, in order to increase greyout tolerance by 1 g from that obtained in a conventional upright seat, a back angle of 58 deg would be required, while increments of 2 g and 3 g would require angles of 69 deg and 74 deg respectively. An anti-g suit was found to give an increase in greyout tolerance of 1.21g and full protection, 3.15g, independant of back angle. When g-tolerance was assessed in terms of psychomotor performance, a similar relationship to back angle was found. Author (ESA)

N79-27074*# Medizinische Hochschule Hannover (West Germany).

BALANCE TRAINING OF THE EQUILIBRIUM ORGAN AND ITS EFFECT ON FLIGHT STRATEGY

Klaus D. Eikemeier, H.-D. Melzig (DFVLR, Brunswick, West Ger.), N. Reicke, and W. Schmidt *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 377-388 refs (For primary document see N79-27070 18-01)

Avail: NTIS HC A99/MF A01 CSCL 06P

N79-27819# Joint Publications Research Service, Arlington, Va.

SIMULATION OF FLUID-ELECTROLYTE METABOLISM AS A MEANS OF PREVENTING ORTHOSTATIC INSTABILITY IN THE CREW OF THE SECOND EXPEDITION ABOARD THE SALYUT-4 STATION

O. G. Gazenko, A. I. Grigor'yev, V. A. Degtyarev, L. I. Kakurin, G. I. Kozyrevskaya, N. A. Lapshina, Yu. V. Natochin, I. P. Neumyvakin, A. S. Nekhayev, and A. A. Savilov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 15-20 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 10-15 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

N79-27820# Joint Publications Research Service, Arlington, Va.

INVESTIGATION OF ALBUMIN AND GLOBULIN COMPOSITION OF BLOOD OF THE CREW OF THE SALYUT-3 ORBITAL STATION

Ye. V. Guseva and R. Yu. Tashpulatov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 21-25 ref Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 15-18 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

N79-27825# Joint Publications Research Service, Arlington, Va.

POSSIBILITIES OF PREVENTING ADVERSE REACTIONS IN SIMULATING THE ACUTE PERIOD OF ADAPTATION TO WEIGHTLESSNESS

V. G. Voloshin, V. A. Karpusheva, V. I. Stepantsov, V. S. Panchenko, and B. F. Asyamolov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 47-52 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 33-37 (For primary document see N79-27817 18-51)

Copyright. Avail: NTIS HC A07/MF A01

N79-27826# Joint Publications Research Service, Arlington, Va.

PROBABILITY OF CAISSON DISEASE WHILE WEARING A SPACE SUIT WHEN EXITING FROM A SPACECRAFT WITH AN ATMOSPHERE CLOSE TO THAT OF EARTH

A. S. Barer, L. G. Golovkin, S. N. Filipenkov, I. N. Chernyakov, and A. A. Sheykin *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 53-59

refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 37-42 (For primary document see N79-27817 18-51)
Copyright. Avail: NTIS HC A07/MF A01

N79-27827# Joint Publications Research Service, Arlington, Va.
PNEUMOTACHOGRAPHIC DISTINCTIONS OF EXTERNAL RESPIRATION IN MAN IN THE PRESENCE OF EXCESS INTRAPULMONARY PRESSURE ON GROUND LEVEL AND AT HIGH ALTITUDES
V. A. Glazkova, I. V. Maksimov, and I. N. Chernyakov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 60-67 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 43-49 (For primary document see N79-27817 18-51)
Copyright. Avail: NTIS HC A07/MF A01

N79-27828# Joint Publications Research Service, Arlington, Va.
EFFECT OF ACUTE HYPOXIA ON SOME PARAMETERS OF RENAL EXCRETORY FUNCTION AND RENAL HEMODYNAMICS
B. G. Zhilis, Ye. F. Kotovskiy, L. S. Uspenskiy, and G. N. Petukhova *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 68-73 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 49-53 (For primary document see N79-27817 18-51)
Copyright. Avail: NTIS HC A07/MF A01

N79-27829# Joint Publications Research Service, Arlington, Va.
TOXICITY OF OXYGEN MIXED WITH HELIUM
G. V. Troshikhin and Zh. A. Donina *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 74-80 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 54-58 (For primary document see N79-27817 18-51)
Copyright. Avail: NTIS HC A07/MF A01

N79-27830# Joint Publications Research Service, Arlington, Va.
EFFECT OF HYPERBARIC OXYGEN ON PERIPHERAL BLOOD NEUTROPHIL METABOLISM
L. S. Keyzer *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 81-85 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 58-61 (For primary document see N79-27817 18-51)
Copyright. Avail: NTIS HC A07/MF A01

N79-27831# Joint Publications Research Service, Arlington, Va.
EFFECT OF BRIEF HEAD-DOWN HYPOKINESIA ON PRESSURE IN VARIOUS PARTS OF THE HEALTHY MAN'S CARDIOVASCULAR SYSTEM
V. Ye. Katkov, V. V. Chestukhin, O. Kh. Zybin, V. M. Mikhaylov, A. Z. Troshin, and V. N. Utkin *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 86-93 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 62-67 (For primary document see N79-27817 18-51)
Copyright. Avail: NTIS HC A07/MF A01

N79-27832# Joint Publications Research Service, Arlington, Va.
EVALUATION OF CIRCULATORY REACTIONS IN THE HEAD TO ANTIORTHOSTATIC POSITION
A. F. Zhernakov *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 94-99 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 67-71 (For primary document see N79-27817 18-51)
Copyright. Avail: NTIS HC A07/MF A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N79-27859# Research Inst. of National Defence, Stockholm (Sweden).
SHALIT PERCEPTUAL ORGANISATION AND REDUCTION QUESTIONNAIRE (SPORQ): THE INSTRUMENT, DESIGN, ADMINISTRATION AND SCORING
Ben Shalit Nov. 1978 27 p refs
(FOA-C-55021-H6) Avail: NTIS HC A03/MF A01

An instrument designed to obtain a qualitative and quantitative assessment of a person's perception of his environment is described. The underlying hypothesis is that an individual's behavior and ability to cope with an environment depends on the coherence of his perception of this environment. The instrument developed is an open ended form in which the person describes 'the factors which he feels to be typical for his life... work, etc.' He then ranks and evaluates these factors. The answers are scored for content and structure and the obtained indices used to assess present and future attitude and behavior aspects. Author (ESA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N79-27860# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY: BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 81
20 Jun. 1979 158 p refs Transl. into ENGLISH from various Russian journals
(JPRS-73729) Copyright. Avail: NTIS HC A08/MF A01

Relevant research is reported in the following areas: agrotechnology, cytology, ecological and environmental problems, engineering psychology, industrial microbiology, nuclear medicine, pharmacology, public health, and the design of instruments and equipment. For individual titles, see N79-27861 through N79-27862.

N79-27861# Joint Publications Research Service, Arlington, Va.
THE SYSTEMIC PRINCIPLES OF BUILDING A MAN-MACHINE CONTROL STAFF
V. M. Yanko *In its* Transl. on USSR Sci. and Technol: Biomed. and Behavioral Sci., No. 81 (JPRS-73729) 20 Jun. 1979 p 58-64 refs Transl. into ENGLISH from Prib. Sist. Upr. (Moscow), no. 4, 1979 p 8-10 (For primary document see N79-27860 18-54)
Copyright. Avail: NTIS HC A08/MF A01

As the complexity of the object (system) of automation grows, the control staff undergoes isolation, transforming into an independent system, intended to coordinate the operations of individual elements within the production system. This isolation increases in proportion to the dimensions and complexity of the production system. The creation of man-machine control staff (ChMAU) requires a quantitative description of the production system, the control system, and the ties between them. Application of general systems theory is recommended for this purpose. From the standpoint of the ideas of systems analysis, the general content of the systemic conception of ChMAU creation means establishing the quantitative mutual relationships between characteristics describing the effectiveness functional of system, the parameters of the production system, and the set of characteristics describing the functional, structural, and informational structure of the control system. A.R.H.

N79-27862# Joint Publications Research Service, Arlington, Va.

EFFECTS OF VIBRATION ON THE HUMAN ORGANISM
R. Lynev *In its* Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci. (JPRS-73729) 20 Jun. 1979 p 108-112 Transl. into ENGLISH from sots. Industriya (Moscow), no. 75, 31 Mar. 1979 p 3 (For primary document see N79-27860 18-54)
Avail: NTIS HC A08/MF A01

Against the background of efforts to reduce the vibration level of machines and mechanisms and to develop insulation materials to protect human operators, some scientists defend vibration and show it to be not only an unavoidable evil of industrialization, but also, in some cases, a blessing. Waveform motion is one of the most prevalent phenomena in nature and is involved in the use of vocal chords, the contraction of stomach walls and muscles, and in the heart and circulatory system. Techniques used in pumping petroleum and in pipeline construction are based on analogies of the circulatory system and its waveform motion. Designers of machinery, while reducing harmful vibrations, should seek to save the range and frequencies of mechanical vibrations which are useful and necessary to man. A.R.H.

N79-27818# Joint Publications Research Service, Arlington, Va.
HELIUM-OXYGEN MIXTURE AND THE ORGANISM HYPERBARIC ASPECT
L. G. Ogorodnikova *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 1-14 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 3-10 (For primary document see N79-27817 18-51)
Copyright. Avail: NTIS HC A07/MF A01

N79-27834# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF PROTEINS OF SOME UNICELLULAR ORGANISMS AS POTENTIAL COMPONENTS OF ECOLOGICAL LIFE SUPPORT SYSTEMS
V. A. Barashkov, I. N. Trubachev, and I. I. Gitel'zon *In its* Space Biol. and Aerospace Med., V. 13, No. 3, 1979 (JPRS-73784) 29 Jun. 1979 p 106-112 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 13, no. 3, 1979 p 75-80 (For primary document see N79-27817 18-51)
Copyright. Avail: NTIS HC A07/MF A01

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

N79-27603*# Atlantic Richfield Co., Harvey, Ill.
ENERGY SUPPLY AND DEMAND IN CALIFORNIA
Edward D. Griffith *In* JPL Proc. of the Conf. on Coal Use for California 15 Aug. 1978 p 56-60 (For primary document see N79-27597 18-42)
Avail: NTIS HC A23/MF A01 CSCL 10B

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N79-27863 Illinois Univ. at Urbana-Champaign.
A NEW HARDWARE APPROACH TO COEFFICIENT DETERMINATION FOR THE LINEAR PREDICTION OF SPEECH Ph.D. Thesis
Daniel Avery Pitt 1979 126 p
Avail: Univ. Microfilms Order No. 7915412

A new hardware approach to the extraction of linear prediction coefficients from speech is given. Crucial to the operation of the device is the incorporation of a central information channel in which the real time speech data are represented in a non weighted binary representation called burst processing. High speed, low precision devices allow inexpensive on-line realization; the averaging process that low precision sampling requires is already an inherent part of the algorithm. Hybrid circuitry yields the flexibility of digital design, such as changing of analog functions such as addition, subtraction, and comparison. A key feature of the machine is the elimination of all multiplications in the coefficient updating scheme. Computer simulation results are given, and a working model which implements a fourth order predictor with only 44 integrated circuits is discussed. Dissert. Abstr.

N79-27864*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MASSIVELY PARALLEL PROCESSOR COMPUTER Patent Application
Lai-wo Fung, inventor (to NASA) (NAS-NRC, Washington, D. C.) Filed 21 May 1979 36 p Sponsored by NASA
(NASA-Case-GSC-12223-1; US-Patent-Appl-SN-041143) Avail: NTIS HC A03/MF A01 CSCL 09B

An apparatus for processing multidimensional data with strong spatial characteristics, such as raw image data, characterized by a large number of parallel data streams in an ordered array, comprises a large number (e.g., 16,384 in a 128 X 128 array) of parallel processing elements operating simultaneously and independently on single bit slices of a corresponding array of incoming data streams under control of a single set of instructions. Each of the processing elements comprises a bidirectional data bus in communication with a register for storing single bit slices memory unit and associated circuitry, including a binary counter/shift register device, for performing logical and arithmetical computations on the bit slices, and an I/O unit for interfacing the bidirectional data bus with the data stream source. The massively parallel processor architecture enables very high speed processing of large amounts of ordered, parallel data, including spatial translation by shifting or 'sliding' of bits vertically or horizontally to neighboring processing elements. NASA

N79-27865*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
DECOMMUTATOR PATCHBOARD VERIFIER Patent Application
John W. Brunson, inventor (to NASA) Filed 22 Jun. 1979 18 p
(NASA-Case-KSC-11065-1; US-Patent-Appl-SN-051271) Avail: NTIS HC A02/MF A01 CSCL 09B

A system for automatically verifying the connections between terminals of a patchboard includes a back plane having a number of plugs corresponding to the pins of the patchboard so that the patchboard can be plugged in. A number of decoders are connected to the plugs of the back plane so that a signal can be sequentially applied to each plug of the back plane under control of a stepping register and a control circuit. A number of data selectors are also connected to the plugs of the back plane and under control of a second external register and control circuit, sequentially make connections between an output circuit and the plugs of the back plane so as to patch the signal applied to a respective plug through a patch connection to the output circuit. By making the above connections in a controlled manner, the precise locations of the patches on the patchboard

can be identified and compared with previously stored information in a memory unit.
Official Gazette of the U.S. Patent and Trademark Office

N79-27866# Raytheon Co., Sudbury, Mass. Equipment Div.
FAULT TOLERANT SPACEBORNE COMPUTER STUDY. PREPROCESSOR DESIGN Final Technical Report, 1 Jun. 1977 - 28 Feb. 1979
J. J. Stiffler 9 Jan. 1979 158 p
(Contract F04701-77-C-0050; AF Proj. 4005)
(AD-A067693; ER79-4005; SAMSO-TR-79-27) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report defines an architecture for a highly reliable spaceborne communications processor. The processor was to be designed to perform the demodulation, decoding, de-interleaving, interleaving, encoding, formatting and routine tasks anticipated for the Air Force Nuclear Forces Communications Satellite. The goal was to define a system having a long-term reliability comparable to that of the SAMSO Fault-Tolerant Spaceborne Computer and having a comparably low redundancy overhead. This technical report will be updated in the future to present a more detailed picture of the Wide Band Signal Processor.
Author (GRA)

N79-27867# IBM Federal Systems Div., Owego, N. Y.
ELECTRICAL CHARACTERIZATION OF 16K DYNAMIC RAMS Final Technical Report
F. D. Austin, J. R. Florini, E. L. Hunter, and F. A. Nezelek Feb. 1979 140 p
(Contract F30602-77-C-0222)
(AD-A067713; RADC-TR-79-5) Avail: NTIS HC A07/MF A01 CSCL 09/2

Electrical characterizations were performed on 16K dynamic RAMs available from the merchant semiconductor industry. Based on the data obtained, parameter limits were established and proposed for a draft 38510 specification. The data, proposed limits, and related discussion are presented. Author (GRA)

N79-27868# Rockwell International Science Center, Thousand Oaks, Calif. Science Center.
COMPUTER CONTROLLED ESR Final Report, 1 Apr. 1973 - Nov. 1978
Ira B. Goldberg Apr. 1979 54 p refs
(Contract N00014-73-C-0325; NR Proj. 051-553)
(AD-A068164; SC549.31FR) Avail: NTIS HC A04/MF A01 CSCL 07/4

Research in the development and application of a computer-controlled EPR spectrometer is described. The limitations and advantages of the computer are discussed in conjunction with studies on unstable organic radical ions, precision of g-factor and hyperfine splitting, measurements, line-shape analysis and determination of transient lifetimes. The computer permitted considerably greater precision in analytical measurements allowing accuracies of + or - 1%. Various data processing algorithms are also briefly discussed. GRA

N79-27869# Raytheon Co., Sudbury, Mass.
BRASSBOARD FAULT TOLERANT SPACEBORNE COMPUTER (BFTSC), VOLUME 1 Final Report, 15 May 1975 - 14 May 1979
A. H. VanDoren 20 Dec. 1978 171 p refs
(Contract F04701-75-C-0149)
(AD-A068553; ER78-4457-Vol-1) Avail: NTIS HC A08/MF A01 CSCL 09/2

This Report describes the design and development of the Brassboard Fault-Tolerant Spaceborne Computer (BFTSC) for the United States Air Force, Space and Missile Systems Organization. The BFTSC is a breadboard model of a self-repairing, highly reliable, general-purpose computer designed to have a 95 percent probability of surviving a five-year mission in a space environment without any degradation in performance. The Report is written in three volumes. Vol 1 contains a description of the computer architecture and the methods employed in achieving Fault Tolerance, with a focus on techniques and fault detection mechanisms. Vol. 2 describes the architectural trade-offs and the fault recovery hardware/software interaction. It also documents the BFTSC construction and testing results, as well as the recommended technologies for fabricating a flight unit computer. Vol. 3 describes work directed specifically toward a prototype flight unit. GRA

N79-27870# Research Inst. of National Defence, Stockholm (Sweden).
ACTIVITIES OF THE LABORATORY FOR IMAGE PROCESSING, 1978 Annual Report
Jan. 1979 39 p
(FOA-C-30159-E1) Avail: NTIS HC A03/MF A01

The activities of the research groups as well as various projects and several methodological studies are described. Work is mainly directed towards digital image processing in connection with handling, presentation, processing, and analysis of pictorial information. Pedagogical activities, lectures, and conferences at the laboratory are also commented on. Author (ESA)

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N79-27871 University of Southwestern Louisiana, Lafayette.
THE SPECIFICATION OF A DECOMPILATION METHODOLOGY FOR DATA FLOW SCHEMA Ph.D. Thesis
Thomas Farrel Reid 1978 157 p
Avail: Univ. Microfilms Order No. 7915005

Low level languages such as data flow schema (DFS) present difficulties in proving assertions about algorithms because the volume of primitive operations often disguises the structures of an algorithm. An equivalent representation for DFS, the predicate/function schema (PFS) is defined, and decompilation, a process in which the graph complexity of a schema is reduced while increasing the complexity of the expressions that define a node's semantics is discussed. An algorithm is presented which proves that well formedness of schema is effectively decidable. Well behavedness and serial reusability are shown to be undecidable, thus lessening the relevance of whether these classes of schema may be completely reduced. Dissert. Abstr.

N79-27872*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Avionics Control and Information Systems.
META ASSEMBLER ENHANCEMENTS AND GENERALIZED LINKAGE EDITOR Final Report
Jun. 1979 98 p
(Contract NAS8-32570)
(NASA-CR-161255; MDC-G8027) Avail: NTIS HC A05/MF A01 CSCL 09B

A meta Assembler for NASA was developed. The initial development of the Meta Assembler for the SUMC was performed. The capabilities included assembly for both main and micro level programs. A period of checkout and utilization to verify the performance of the Meta Assembler was undertaken. Additional enhancements were made to the Meta Assembler which expanded the target computer family to include architectures represented by the PDP-11, MODCOMP 2, and Raytheon 706 computers.
M.M.M.

N79-27873*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORRC/SAIL INTERFACE CONTROL DOCUMENT FOR SAIL OFT DATA TAPES, REVISION A
May 1979 41 p
(NASA-TM-80479; IN-77-FM-007-Rev-A; JSC-12866-Rev-A) Avail: NTIS HC A03/MF A01 CSCL 09B

The formats for all orbital flight tests magnetic tape recordings produced in the Johnson Space Center Shuttle Avionics Laboratories which are required to be processed in the orbiter data reduction complex or by the mission control center network interference processor are described. M.M.M.

N79-27874# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CORRECTING MEMORY OF MICROCONTROL SYSTEM AIDED BY A COMPUTER [EMULADOR DE MEMORIAS DE MICROCONTROLE AUXILIADO POR COMPUTADOR]

Paulo Faria Santos Amaral May 1979 163 p In PORTUGUESE; ENGLISH summary
(INPE-1489-TDL/009) Avail: NTIS HC A08/MF A01

The design and simulation of a very useful microprogramming support system is presented. It is operated under the operating system of the minicomputer HP2116B or in a stand alone fashion. The user is allowed to load, test, modify and debug a microprogram in its real time environment, during the design phase of the microprogrammed device, and to make the diagnosis and maintenance of the final prototype. Once a microprogram is certified, the system generates a paper tape so that it can be directly loaded in PROM's by a PROM programmer. S.E.S.

N79-27875*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.

SOFTWARE REQUIREMENTS FOR THE STUDY OF CONTEXTUAL CLASSIFIERS AND LABEL IMPERFECTIONS

C. B. Chittineni May 1979 18 p refs
(Contract NAS9-15800)
(NASA-CR-160239; JSC-14871; LEC-13353) Avail: NTIS HC A02/MF A01 CSCL 09B

The software requirements for the study of contextual classifiers and imperfections in the labels are presented. In particular, the requirements are described for updating the posteriori probability of the picture element under consideration using information from its local neighborhood, designing the Fisher classifier, and other required routines. Only the necessary equations are given for the development of software. J.M.S.

N79-27876# New York Univ., N. Y. Inst. of Mathematical Sciences.

AUTOMATIC DISCOVERY OF HEURISTICS FOR NON-DETERMINISTIC PROGRAMS

Salvatore J. Stolfo and Malcolm Harrison Jan. 1979 36 p refs
(Contract N00014-75-C-0571)
(AD-A067546; TR-007) Avail: NTIS HC A03/MF A01 CSCL 09/2

During the last few years a number of relatively effective AI programs have been written incorporating considerable amounts of problem specific knowledge. Consequently, the problem of encoding such knowledge in a useful form has emerged as one of the central problems of AI. In particular, Declarative representations of knowledge have attracted much attention partly because of the relative ease with which knowledge can be communicated in this form. Unfortunately, implementation of Declaratively specified knowledge corresponds to a non-deterministic program which incurs enormous computational costs. This paper discusses one way to limit this cost. The approach we take is to develop control heuristics for a family of problems from traces of sample solutions generated during a training session with a human expert. Algorithms have been developed which recognize a predefined set of patterns in the sequence of 'knowledge applications' and which compile descriptions of these patterns in a control language, called CRAPS. More specifically, patterns of repeating, parallel and common sequences are considered in the analysis. The CRAPS descriptions generated are then used for guidance in solving subsequent problems. We discuss the utility of such an approach and give an example of a generated CRAPS description.
Author (GRA)

N79-27877# Syracuse Univ., N. Y.

BAYESIAN SOFTWARE PREDICTION MODELS. VOLUME 5: SUMMARY OF TECHNICAL PROGRESS Final Technical Report, Jan. 1976 - Apr. 1978

Amrit L. Goel Oct. 1978 103 p refs
(Contract F30602-76-C-0097)
(AD-A067690; TR-78-5; RADC-TR-78-155-Vol-5) Avail: NTIS HC A06/MF A01 CSCL 09/2

This report summarizes the technical activities pursued under Contract F30602-76-C-0097, Bayesian Software Prediction Models, with Rome Air Development Center. Research work, discussed in previous volumes, discussing imperfect debugging and imperfect maintenance software performance models, is summarized and some additional work in development of software reliability demonstration test plans is described.
Author (GRA)

N79-27878# Minnesota Univ., Minneapolis. Dept. of Psychology.

COMPUTER PROGRAMS FOR SCORING TEST DATA WITH ITEM CHARACTERISTIC CURVE MODELS

Isaac I. Bejar and David J. Weiss Feb. 1979 93 p refs
(Contract N00014-76-C-0627; RR0420401)
(AD-A067752; RR-79-1) Avail: NTIS HC A05/MF A01 CSCL 09/2

Three computer programs are described for scoring test response data using item characteristic curve (ICC) or latent trait models. The rationale and mathematical basis of both maximum likelihood and Bayesian ICC scoring methods are presented, as well as some data comparing the two methods of scoring. The three computer programs are designed for scoring conventional (linear) test data (LINDSCO) in dichotomous response format, adaptive test dichotomous data (ADADSCO), and conventional (linear) test data scored by polychotomous ICC models (LINPSCO). Options available in these three general purpose programs are described, and examples of the input and output are given for each program. Complete FORTRAN listings of the three programs are included. Author (GRA)

N79-27879# IBM Watson Research Center, Yorktown Heights, N.Y. Mathematical Sciences Dept.

TOPICS IN MATHEMATICAL PROGRAMMING. RESEARCH IN NONDIFFERENTIABLE AND DISCRETE OPTIMIZATION Final Report, 1 Oct. 1976 - 30 Sep. 1978

E. L. Johnson and P. S. Wolfe Nov. 1978 11 p refs
(Contract F49620-77-C-0014)
(AD-A067554; AFOSR-79-0420TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Activity and research in Nondifferentiable Optimization (NDO) and Discrete Optimization are described. (1) Conjugate descent methods have been extended to constrained NDO problems. (2) A robust and efficient algorithm for the minimization of an arbitrary convex univariate function has been devised. (3) Substantial improvements have been made to subgradient optimization ('relaxation') methods for solving large systems of linear inequalities. (4) The subadditive characterization of facets of integer programming polyhedra has been extended to a very general class of pure integer problems. (5) Work has continued on use of subadditive functions to give a satisfactory duality theory for integer programming, to provide pricing information, and eventually to solve problems. (6) The theories of blocking pairs of polyhedra and anti-blocking pairs of polyhedra have been extended, and we have characterized pairs of polyhedra which are, respectively, the blocker and anti-blocker of some unspecified third polyhedron. GRA

N79-27880# Maryland Univ., College Park. Dept. of Computer Science.

INVESTIGATING SOFTWARE DEVELOPMENT APPROACHES Interim Report

Victor R. Basil and Robert W. Reiter, Jr. Aug. 1978 117 p refs
(Grant AF-AFOSR-3181-77)
(AD-A068742; TR-688; SEL-2; AFOSR-79-0540TR) Avail: NTIS HC A06/MF A01 CSCL 09/2

This paper reports on research comparing various approaches, or methodologies, for software development. The study focuses on the quantitative analysis of the application of certain methodologies in an experimental environment, in order to further understand their effects and better demonstrate their advantages in a controlled environment. A series of statistical experiments were conducted comparing programming teams that used a disciplined methodology (consisting of top-down design, process design language usage, structured programming, code reading, and chief programmer team organization) with programming teams and individual programmers that employed ad hoc approaches. Specific details of the experimental setting, the investigative approach (used to plan, execute, and analyze the experiments), and some of the results of the experiments are discussed. GRA

N79-27881# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
GRAPH: AN INTERACTIVE COMPUTER PROGRAM USED FOR TECHNICAL PLOTTING Final Report, 1 Jul. 1977 - 1 Aug. 1978
Sandra K. Drake Nov. 1978 100 p refs
(AF Proj. 3066)
(AD-A068668; AFAPL-TR-78-90) Avail: NTIS HC A05/MF A01 CSCL 09/2

This technical report describes a computer program 'graph' which supplies a capability to do efficient plotting of all types of analytical data in a manner suitable for direct substitution into technical papers and articles. 'DISSPLA', a prepackaged set of subroutines from Integrated Software Systems Corporation was used in creation of 'graph'. Input is designed for the TEK 4010 on-line computer terminal. Style and format of the created plot is specified by the user through interactive questions and answers. Options include special alphabets, curve fitting procedures, axis labeling and scaling, and the use of multiple curves on one plot. GRA

N79-27882# Texas Univ. at Austin. Center for Cybernetic Studies.
SEPARABLY-INFINITE PROGRAMS
A. Charnes, P. R. Gribik (Carnegie-Mellon Univ., Pittsburgh), and K. O. Kortaner (Carnegie-Mellon Univ., Pittsburgh) Mar. 1979 25 p refs
(Contract N00014-75-C-0569; NR Proj. 047-021; Grant NSF ENG-76-05195)
(AD-A068923; CCS-334) Avail: NTIS HC A02/MF A01 CSCL 12/1

Separably-infinite programs are a class of linear infinite programs that are related to semi-infinite programs and which have applications in economics and statistics. These programs have an infinite number of variables and an infinite number of contraints. Only a finite number of variables appear in an infinite number of constraints, and only a finite number of constraints have an infinite number of variables. Duality in this class of programs was studied and used to develop a system of nonlinear equations satisfied by optimal solutions of the primal and dual programs. This nonlinear system was used in numerical techniques for solving separably-infinite programs. S.E.S.

N79-27883# Wisconsin Univ. - Madison. Mathematics Research Center.
ROSCOE USER GUIDE, VERSION 1.1
Raphael Finkel, Marvin Solomon, and Ron Tischler Mar. 1979 29 p
(Contract DAAG29-75-C-0024)
(AD-A068864; MRC-TSR-1930) Avail: NTIS HC A03/MF A01 CSCL 09/2

Roscoe is a multi-computer operating system running on a network of LSI-11 computers at the University of Wisconsin. This document describes Roscoe from the viewpoint of a user or a writer of user-level programs. All system service calls and library routines are described in detail. In addition, the command-line interpreter and terminal input conventions are discussed. Companion reports describe the purposes and concepts underlying the Roscoe project and give detailed accounts of the Roscoe utility kernel and utility processes. GRA

N79-27884# Wisconsin Univ. - Madison. Mathematics Research Center.
STRONGLY STABLE STATIONARY SOLUTIONS IN NONLINEAR PROGRAMS
Masakazu Kojima Feb. 1979 23 p refs
(Contract DAAG29-75-C-0024; Grant NSF MCS-78-09525)
(AD-A068903; MRC-TSR-1920) Avail: NTIS HC A02/MF A01 CSCL 12/1

When we construct mathematical models from practical problems in the field of operations research, economics, engineering, etc., the data which we can utilize usually have uncertainty. We may not get exact data or the data may be changing as time goes. In such a model it is important to take account of the stability of the solution. Here we say that a solution to a model is stable if any slight perturbation to the data yields a small change of the solution. In this paper we study stability of a mathematical programming model, which involves an objective function to be minimized (or maximized) under certain constraints. We give conditions on the data of the model which characterize the stability. Applications to a mathematical programming model having parameters and a class of computational methods are also discussed. GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N79-27885# California Univ., Livermore. Lawrence Livermore Lab.
LLL OCTOPUS NETWORK: SOME LESSONS AND FUTURE DIRECTIONS
R. W. Watson Jun. 1978 11 p refs Presented at the 3d USA-Japan Computer Conf., San Francisco, 10 Oct. 1978
(Contract W-7405-eng-48)
(UCRL-81067; Conf-7810140-1) Avail: NTIS HC A02/MF A01

The Octopus network, a pioneering, high-performance, local computer network is presented. Several lessons derived from the 14 years of experience in the evolution of Octopus are described, and some of the directions to be taken in its medium term future are indicated. DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N79-27886# SRI International Corp., Menlo Park, Calif. Artificial Intelligence Center.
A FRAMEWORK FOR ARTIFICIAL INTELLIGENCE Final Report
Nils J. Nilsson Mar. 1979 94 p refs
(Contract N00014-77-C-0222)
(AD-A068188) Avail: NTIS HC A05/MF A01 CSCL 09/2

A framework is presented for several major ideas underlying Artificial Intelligence (AI) techniques. Two important components of this framework involve production systems and the predicate calculus. The thesis is proposed that a generalized production system architecture is the basic structure of most AI systems. Predicate calculus provides a language for the production rules and for the data structures on which these rules operate. Several different types of production systems are identified; these distinctions help to classify different kinds of AI systems. Two major types correspond roughly to AI systems for theorem proving and for robot problem solving. The last section of the report discusses similarities between a semantic network formalism and predicate calculus. The use of semantic networks in problems involving reasoning about class hierarchies and default information is described. Author (GRA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N79-27887 Alabama Univ., University.
THE EXISTENCE OF MATRICES WITH PRESCRIBED CHARACTERISTIC POLYNOMIALS Ph.D. Thesis
David Keller Baxter 1978 49 p
Avail: Univ. Microfilms Order No. 7915009

The existence of matrices and linear operators with prescribed polynomials and prescribed image vectors is considered. The existence of such a linear operator tau is ensured only if the subspace U has no nonzero subspaces which are invariant with respect to the linear transformation epsilon. The existence of matrices with prescribed characteristic and permanental polynomials is examined. This problem is solved over algebraically closed

fields and and also over the field of all real numbers by obtaining the desired conditions in terms of simple relations on the coefficients of d(lambda) and p(lambda). Dissert. Abstr.

N79-27888 Maryland Univ., College Park.
AN INVESTIGATION OF K-FOLO COMPLEX COBORDISM Ph.D. Thesis
Lawrence Baker 1978 107 p
Avail: Univ. Microfilms Order No. 7915779

For each positive integer k, there is a ring spectrum MkU. The free part of $II^*(MkU)$, denoted Free $II^*(MkU)$, is studied from the cobordism viewpoint. Additionally, the Adams spectral sequence is used to obtain information on Tor $II^*(MkU)$, the torsion part of $II^*(MkU)$. Two Riemann-Roch theorems are proved, which give divisibility relations on the Chern characteristic numbers of elements in Free $II^*(MkU)$; kU-manifolds are constructed which, to a large extent, precisely meet these divisibility conditions. The Adams spectral sequence is used to prove that Free $II^*(MpU)$, p prime, is not a polynomial ring. Furthermore, partial knowledge of Free $II^*(MpU)$ is used to calculate differentials in the Adams spectral, thereby obtaining information on Tor $II^*(MpU)$. In particular, $II^*(M3U)$ is computed in low dimensions. Dissert. Abstr.

N79-27889 Illinois Univ. at Chicago Circle, Chicago.
STABILITY OF THE COINCIDENCE SET FOR THE SIGNORINI PROBLEM Ph.D. Thesis
John Athanasopoulos 1979 100 p
Avail: Univ. Microfilms Order No. 7916372

In the space of twice continuously differentiable functions a dense subset in the C square-norm topology is found, such that for any obstacle belonging to this dense subset its coincidence set consists of a finite number of intervals. An analytic obstacle gives rise to a coincidence set of finite intervals. Estimates obtained for the difference of two solutions to the corresponding variational inequalities show that a nearby obstacle will not disturb the coincidence set away from the endpoints of the intervals. At the endpoints of every interval, with the help of the Cauchy Problem, a local series development is obtained for the solution. This facilitates the study of the behavior of the solution for the analytic obstacle. Dissert. Abstr.

N79-27890 North Carolina State Univ. at Raleigh.
VINCENT'S THEOREM IN ALGEBRAIC MANIPULATION Ph.D. Thesis
Alkiviadis Georgiou Akritas 1978 183 p
Avail: Univ. Microfilms Order No. 7915515

Vincent's theorem and its applications in the isolation of the real roots of an integral polynomial were studied. Real root isolation is defined as the process of finding real intervals such that each contains exactly one real root and every real root is contained in some interval. Dissert. Abstr.

N79-27891 California Univ., Los Angeles.
NON-FINITELY BASED BINARY ALGEBRAS DERIVED FROM LATTICES Ph.D. Thesis
Caroline Ruth Shallon 1979 152 p
Avail: Univ. Microfilms Order No. 7915681

Finite equational bases are given for the two classes of algebras derived from distributive lattices. But the class of modular lattices and two of the nonmodular classes are shown to be nonfinitely based. Two of the classes are each generated by a single four element subalgebra of a *-algebra from a finite lattice. Dissert. Abstr.

N79-27892 California Univ., Berkeley.
A STUDY OF SAMPLING SCHEMES FOR FOURIER TRANSFORM RECONSTRUCTION WITH AN ERROR ANALYSIS Ph.D. Thesis
Marci Ann Perlstadt 1978 114 p
Avail: Univ. Microfilms Order No. 7914728

A problem that arises in radio astronomy as well as in other fields was studied. Radio astronomers measured the visibility of a source in order to obtain its brightness distribution. Different quantities associated with this matrix were investigated to determine the effectiveness of the sampling scheme. The so-called natural scheme of equidistant samples is optimal only under special circumstances and can often lead to poor results. Bounds are developed to relate the different quantities measured, and alternatives to equispaced sampling are proposed. The results obtained with the simplified model indicate that there is little reason for a radio astronomer to assume, a priori, that equispaced samples are best. Dissert. Abstr.

N79-27893 North Carolina State Univ. at Raleigh.
SOME THEOREMS AND COUNTEREXAMPLES IN MONOTONE APPROXIMATION Ph.D. Thesis
Gary Yates Fletcher 1978 56 p
Avail: Univ. Microfilms Order No. 7915528

The approximation in the sup norm of functions in C(-1,1) by algebraic polynomials was studied. A conjecture is verified of Roulier that for a function in C(-1,1) whose first divided differences are positive and bounded away from zero, the polynomial of best approximation of degree n or less need not be monotone, regardless of the size of n, even if the function is continuously differentiable. A theorem of Kadec which concerns the distribution of the alternation points in Chebyshev approximation is modified. The Strong Unicity Theorem, a classical result in approximation theory, is shown not to hold when the approximating polynomials are restricted to be monotone. The main result is the construction of a function which furnishes the counterexample. It is shown, however, that appropriate modifications of the Strong Unicity Theorem are available which remain valid in the monotone setting. Dissert. Abstr.

N79-27894*# Houston Univ., Tex. Dept. of Mathematics.
A MODIFICATION OF THE LIKELIHOOD EQUATIONS FOR NORMAL CLASSES WITH FIELD STRUCTURE, PRELIMINARY REPORT
Charles Peters Jun. 1979 10 p refs
(Contract NAS9-15543)
(NASA-CR-160266; Rept-73) Avail: NTIS HC A02/MF A01 CSCL 12A

A statistical model on normal mixtures which takes into account the organization of LANDSAT agricultural data into fields which are homogeneous as to crop type is presented. Likelihood equations for the parameters of the model are derived which may be solved iteratively as in UHMLE. S.E.S.

N79-27895# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TRANSFORMATIONS OF SPHERICAL HARMONICS AND APPLICATIONS TO GEODESY AND SATELLITE
Giorgio E. O. Giacaglia Apr. 1979 20 p refs Presented at 9th Congresso Brasileiro de Cartografia, Parana, Brazil, 4-9 Feb. 1979
(INPE-1453-RPE/018) Avail: NTIS HC A02/MF A01

Compact formulas for the transformation of spherical harmonics under rotation and translation are developed. The results are discussed in view of their possible applications to problems of celestial mechanics, satellite geodesy, and to the theory of the geopotential. The formula for product-sum conversion is developed independently of the use of Clebsch-Gordon coefficients. The problem of solving the geopotential at the surface of the earth in terms of the radius of the geoid is analyzed. Author

N79-27896# Instituto Technologico de Aeronautica, Sao Paulo (Brazil).
PHYSICAL COMPONENTS OF TENSORS Ph.D. Thesis [COMPONENTES FISICALS DETENSORES]
Antonio Marmo deOliveira [1978] 92 p refs In SPANISH; ENGLISH summary
Avail: NTIS HC A05/MF A01

By introducing the physical components of double tensor fields, formulas are obtained for the change of physical components, due to coordinate transformations, which are akin to the existing ones for tensor components. A dimensional analysis for tensors is developed and expressions for the physical components of covariant derivatives of second and third order tensors in general curvilinear coordinates are derived. M.M.M.

N79-27897# Illinois Univ. at Urbana-Champaign, Urbana. Dept. of Physics.
TRANSVERSE MOMENTUM DISTRIBUTIONS IN DRELL-YAN PROCESSES
C. Y. Lo and J. D. Sullivan Jun. 1979 12 p refs

(Grant NSF 79-00272)
(ILL-(TH)-79-22) Avail: NTIS HC A02/MF A01

Gauge theory predictions are calculated in leading logarithmic approximation for the transverse momentum distribution of virtual photons produced via the Drell-Yan annihilation process. The leading contributions sum to a simple exponential form in agreement with a recent conjecture of Parisi and Petronzio and in disagreement with the finding of Dokshitser, D'Yakonov and Troyan. Author

N79-27898# North Carolina Univ. at Chapel Hill. Dept. of Statistics.
CHARACTERIZATIONS OF THE EXPONENTIAL DISTRIBUTIONS BY RELEVATION TYPE EQUATIONS
E. Grosswald (Temple Univ., Philadelphia), Samuel Kotz (Temple Univ., Philadelphia), and N. L. Johnson Mar. 1979 11 p refs
(Contract DAAG29-77-C-0035; Grant AF-AFOSR-3673-78)
(AD-A067542; MMS-1218; ARO-14778.5-M) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this note two characterizations of the exponential distribution are discussed, based on a generalization of the lack of memory property. These results were motivated by the notion of 'relevation of distributions' introduced by Krakowski (1973). Author (GRA)

N79-27899# Naval Postgraduate School, Monterey, Calif.
ARITHMETIC CODES M.S. Thesis
Tarcisio J. C. Pereira (Brazilian Navy) Dec. 1978 100 p refs
(AD-A067579) Avail: NTIS HC A05/MF A01 CSCL 09/2

This thesis constitutes a tutorial study on the theory of arithmetic codes. Both non-separate and separate codes are discussed. Cyclic AN codes are presented and their analogy with cyclic parity check error correcting codes is emphasized. Also, a brief discussion of the implementation problem is carried out. GRA

N79-27900# Texas A&M Univ., College Station. Inst. of Statistics.
INVESTIGATION OF A MULTIPLE TIME SERIES MODEL
David Tritchler Feb. 1979 21 p refs
(Contract N00014-78-C-0599)
(AD-A067770; TR-N-4) Avail: NTIS HC A02/MF A01 CSCL 12/1

We show how modern techniques of multiple time series analysis can be used to determine if two time series are related by the model: Y(t) - (gamma sub 0)X(t) = (gamma sub 1)X(t - 1) + ETA(t), X(t) - alpha X(t - 1) = epsilon(t). Author (GRA)

N79-27901# Texas A&M Univ., College Station. Inst. of Statistics.
MULTIPLE TIME SERIES MODELING 2
Emanuel Parzen and H. J. Newton Feb. 1979 32 p refs
(Contract N00014-78-C-0599)
(AD-A067644; TR-N-1) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper defines the problem of time series modeling as model identification (determining the predictor variables) and parameter identification (estimating the prediction filter and the prediction error covariance matrix). Various auto-regression and cross-regression representations are defined for a stationary multiple time series. The role of basic regression and latent value algorithms is discussed. It is suggested that principal component analysis of spectral density matrices may not be useful in practice, whereas autoregressive methods are. The problem of defining an index time series is discussed; an approach is described in terms of the notion of predictable components. Author (GRA)

N79-27902# Center for Naval Analyses, Arlington, Va.
A SECRETARY PROBLEM WITH A RANDOM NUMBER OF CHOICES
Kenneth S. Glasser Mar. 1979 32 p Submitted for publication
(AD-A068186; CNA-PP-249) Avail: NTIS HC A03/MF A01 CSCL 12/1

In this paper, the best-choice secretary problem is modified to allow the player to make more than one choice. The probability of selecting the best object is computed. The optimal starting time is characterized, and expressions are derived for the expected number of objects chosen and the expected number of objects sampled by this procedure. Asymptotic results are also derived. GRA

N79-27903# Wisconsin Univ. - Madison. Mathematics Research Center.
ANALYSIS OF FINITE ELEMENT METHODS FOR SECOND ORDER BOUNDARY VALUE PROBLEMS USING MESH DEPENDENT NORMS
I. Babuska (Maryland Univ., College Park) and J. Osborn Feb. 1979 23 p refs
(Contracts DAAG29-75-C-0024; E(40-1)-3443; Grants NSF MCS-76-06963; NSF MCS-78-02851)
(AD-A068902; MRC-TSR-1919) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper presents a new approach to the analysis of finite element methods based on C-finite elements for the approximate solution of 2nd order boundary value problems in which error estimates are derived directly in terms of two mesh dependent norms that are closely related to the L2 norm and to the 2nd order Sobolev norm, respectively, and in which there is no assumption of quasi-uniformity on the mesh family. This is in contrast to the usual analysis in which error estimates are first derived in the 1st order Sobolev norm and subsequently are derived in the L2 norm and in the 2nd order Sobolev norm - the 2nd order Sobolev norm estimates being obtained under the assumption that the functions in the underlying approximating subspaces lie in the 2nd order Sobolev space and that the mesh family is quasi-uniform. GRA

N79-27904# Lincoln Lab., Mass. Inst. of Tech., Lexington.
ON OPTIMAL DISCRIMINANTS BETWEEN TWO CLASSES OF RANDOM VARIABLES IN TERMS OF THE MOMENTS OF THEIR DISTRIBUTIONS
Lee K. Jones 28 Feb. 1979 26 p refs
(Contract F19628-78-C-0002)
(AD-A068551; TN-1979-22; ESD-TR-79-31) Avail: NTIS HC A03/MF A01 CSCL 12/1

For many problems of interest in statistical pattern recognition, density estimates for a random variable X of dimension d are unreliable unless the number of sample vectors is very large. For even moderately large sample sizes are often insufficient, however, lower order moments may be accurately estimated. In this paper we are concerned with the problem of optimally discriminating between two classes of random variables in terms of the available information about them of reasonable accuracy (their lower order moments). In no case do we make any assumption about the form of the probability densities of random variables X. (We do in some cases assume certain forms for the densities of functions of these random variables L(X).) GRA

N79-27905# Ohio State Univ., Columbus. Dept. of Physics.
GAUGE FIELD THEORIES. PART 3: RENORMALIZATION
P. H. Frampon 1978 106 p refs
(Contract EY-76-C-02-1545)
(COO-1545-245-Pt-3) Avail: NTIS HC A06/MF A01

The renormalization of nonabelian gauge theories both with exact symmetry and with spontaneous symmetry breaking is discussed. The method of dimensional regularization is described and used in the ensuing discussion. Triangle anomalies and their implications and the method for cancellation of anomalies in an SU(2) X U(1) theory, introduction of the BRS form of local guage transformation and its use for the iterative proof of renormalizability to all orders for pure Yang-Mills and with fermion and scalar matter fields are considered. The demonstration of renormalizability is given for vectors arising from spontaneous breaking. DOE

N79-27906# Illinois Univ. at Urbana-Champaign, Urbana. Dept. of Computer Science.
GENERALIZED ELEMENT METHOD
B. Speelpenning Nov. 1978 24 p refs
(Contract EY-76-S-02-2383)
(COO-2383-0055; UILU-ENG-78-1738; UIUCDCS-R-78-946)
Avail: NTIS HC A02/MF A01

A method for solving large, sparse symmetric systems of equations derived from networks is presented. The method is

particularly suited to networks arising from using the finite element method. The main characteristics of the method are its homogeneity and efficiency. Homogeneity allows automatic substructuring, interrupt, and restart facilities, all completely controlled by the elimination sequence of the nodes. For each elimination sequence, minimal operation count is achieved. The amount of I/O can be controlled to a certain extent. The generalized element method evolved from a new interpretation of the wavefront method. It is used adaptively in combination with such methods as the hypermatrix method to optimize the use of available core. DOE

N79-27907# Illinois Univ., Urbana. Dept. of Computer Science.
STABILITY OF VARIABLE-STEP METHODS FOR ORDINARY DIFFERENTIAL EQUATIONS
C. W. Gear Jul. 1978 14 p refs
(Contract EY-76-S-02-2383)
(COO-2383-0048; UIUCDCS-R-78-931; UILU-ENG-78-1723)
Avail: NTIS HC A02/MF A01

It is proved that, for any multistep formula which is strongly stable at constant stepsize, there exists constants by< B such that, if the ratio of adjacent steps satisfies b < or h/sub n//h/sub n-1/ < or B, the variable-step implementation of the formula is stable. A practical step-order control restriction which guarantees stability is given. DOE

N79-27908# Harvard Univ., Cambridge, Mass. Museum of Comparative Zoology.
STUDY OF MATHEMATICAL MODELS OF MUTATION AND SELECTION IN MULTI-LOCUS SYSTEMS Progress Report, 1 Dec. 1974 - 30 Nov. 1978
R. C. Lewontin 1978 30 p refs
(Contract EY-76-S-02-2472)
(COO-2472-04) Avail: NTIS HC A03/MF A01

Progress is reported on the following research projects: spartial variation in environments; temporal variation in environments; patterns of phenotypic variation; game-theoretical formulations in population genetics; dynamics of gene frequency dependent fitness systems; multiple allelic equilibria; time dependent behavior of gene frequencies in stochastic models; the effect of selfing on linkage and selection; and multiple outcomes of selective regimes. DOE

N79-27909# Research Inst. of National Defence, Stockholm (Sweden).
BACKWARD SOLUTION OF NONLINEAR DIFFERENTIAL EQUATIONS. PART 2: NONLINEAR EQUATIONS WITH FORCED FUNCTIONS
Lennart Brandqvist Dec. 1978 20 p refs
(FOA-C-20284-E3) Avail: NTIS HC A02/MF A01

A backward solution of nonlinear differential equations with forced functions is presented. The theory can be applied to the synthesis of nonlinear control systems. A case of particular interest appears when the output x(t) of the system is chosen directly proportional to the input u(t). In this case the specific transfer function for the system becomes constant. Author

N79-27910# Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
THE THIRD MILLENIUM ROOTS OF BABYLONIAN MATHEMATICS. PART 1: A METHOD FOR THE DECIPHERMENT, THROUGH MATHEMATICAL AND METROLOGICAL ANALYSIS, OF PROTO-SUMERIAN AND PROTO-ELAMITE SEMI-PICTOGRAPH INSCRIPTIONS
Joeran Friberg 1978 59 p refs
(CTH-Math-1978-9) Avail: NTIS HC A04/MF A01

Systems of metrological equations are used for the determination of the relative values of the units and subunits of a metrological system written with undeciphered number signs. The methods are tested on a small number of proto-Elamite ennesform texts (from Susa) and proto-Sumerian texts (from the Jendet-Nasr period). It is found that both text classes made use of a sexagesimal numerational system where a small disk-shaped punch-mark stands for the (relative) value of 10 as well as for a grain-measure-system where the same number sign has the value of 6. Many proto-Elamite and proto-Sumerian texts are cleared up, at least in the mathematical sense, by the above conclusion. The paper is an introduction to the series titled 'The Third Millenium Roots of Babylonian Mathematics'. Author (ESA)

N79-27911# Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
ON RATIONAL APPROXIMATIONS OF GROUPS OF OPERATORS
Philip Brenner and Vidar Thomee 1978 15 p refs
(CTH-Math-1978-10-1) Avail: NTIS HC A02/MF A01

Stability and convergence of rational approximations r to the n power (hA), nh = t, of a strongly continuous semigroup e to the tA power on a Banach space X, when the absolute value r(Z) is less than or equal to 1 for Re Z is less than or equal to 0, is outlined. These results are used with applications to hyperbolic problems. It is shown that if A generates a group on X, previous results extend to the case when the absolute value r (Z) is less than or equal to 1 for RE Z equals 0 and e to the tA power is a bounded operator between two Banach spaces X sub 0 and X sub 1 with X cap X sub 0 dense in X sub 0. Author (ESA)

N79-27912# Fondazione Ugo Bordoni, Rome (Italy).
INDICIAL RESPONSE INVARIANCE IN DISCRETE TIME VARIABLE SYSTEMS [INVARIANZA DELLA RIPOSTA INDICIALE NEI SISTEMI TEMPO DISCRETI]
Domenico DeSeta, Wolfgang Maggi, and Flavio Riciniello (SIP) Dec. 1977 14 p refs In ITALIAN
(FUB-42-1977) Avail: NTIS HC A02/MF A01

The relation between continuous time variable and discrete time variable transforms in linear systems was examined in order to study the effect of imposing the condition on conservation of the indicial response. An algorithm for the transformation from s variable to z variable is presented, including analogues with the z-standard transformation. An example, refering to the performance evaluation of a digital transmission regenerator for coaxial cable transmissions, is discussed. Author (ESA)

N79-27913# Research Inst. of National Defence, Stockholm (Sweden).
ON THE COMPLEXITY OF MULTIVARIABLE QUERY EVALUATION
Stefan Arnborg Mar. 1979 33 p refs
(FOA-C-20292-D8) Avail: NTIS HC A03/MF A01

Efficient algorithms are defined for restricted classes of multivariable query evaluation problems. The restrictions are shown to be necessary for avoiding NP-difficult computations. The query evaluation problem is transformed to a hyper-graph search problem, and standard graph-searching techniques are used. The emphasis in the analysis is on worst-case, although heuristic search improvement techniques are discussed informally. Author (ESA)

N79-27914# Royal Netherlands Meteorological Inst., De Bilt.
EXPERIMENTS WITH ITERATIVE METHODS FOR SOLVING THE DISCRETE POISSON EQUATION
S. J. Bijlsma and R. J. Hoogendoorn 1979 45 p refs
(KNMI-WR-79-1) Avail: NTIS HC A03/MF A01

Several fast iterative methods for solving systems of linear equations resulting from the finite difference approximation in elliptic partial differential equations were compared using the relatively simple problem of solving the Poisson equation with Dirichlet boundary conditions on an octagon. Attention was paid to stop criteria for iterative procedures. Experiments are given comparing the number of iterations for different stop criteria and also the iteration time ratio with respect to the point successive overrelaxation (SOR) method. Results show that the given criteria are well suited to determine the optimum relaxation parameter experimentally. Author (ESA)

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N79-27915 Johns Hopkins Univ., Baltimore, Md.
A SIMPLE METHOD TO INCREASE THE ROBUSTNESS OF

t-TYPE INTERVAL ESTIMATORS IN SOME PRACTICAL SITUATIONS Ph.D. Thesis
Timothy S. Wyant 1979 139 p
Avail: Univ. Microfilms Order No. 7914314

The properties of several interval estimators for the mean are reviewed, with particular emphasis on the t interval from normal distribution theory. Empirical and analytical arguments are presented which support the choice of a transform-mean interval estimator (if f is properly chosen) over rival estimators when a simple and robust estimator is needed. Criteria are developed for choosing an effective f. Dissert. Abstr.

N79-27916*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
LOCAL NEIGHBORHOOD TRANSITION PROBABILITY ESTIMATION AND ITS USE IN CONTEXTUAL CLASSIFICATION
C. B. Chittineni May 1979 33 p refs
(Contract NAS9-15800)
(NASA-CR-160261; LEC-13344; JSC-14859) Avail: NTIS HC A03/MF A01 CSCL 12A

The problem of incorporating spatial or contextual information into classifications is considered. A simple model that describes the spatial dependencies between the neighboring pixels with a single parameter, Theta, is presented. Expressions are derived for updating the posteriori probabilities of the states of nature of the pattern under consideration using information from the neighboring patterns, both for spatially uniform context and for Markov dependencies in terms of Theta. Techniques for obtaining the optimal value of the parameter Theta as a maximum likelihood estimate from the local neighborhood of the pattern under consideration are developed. S.E.S.

N79-27917*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
EFFICIENT FEATURE SUBSET SELECTION WITH PROBABILISTIC DISTANCE CRITERIA
C. B. Chittineni May 1979 27 p refs
(Contract NAS9-15800)
(NASA-CR-160263; LEC-13355; JSC-14870) Avail: NTIS HC A03/MF A01 CSCL 12A

Recursive expressions are derived for efficiently computing the commonly used probabilistic distance measures as a change in the criteria both when a feature is added to and when a feature is deleted from the current feature subset. A combinatorial algorithm for generating all possible r feature combinations from a given set of s features in (s/r) steps with a change of a single feature at each step is presented. These expressions can also be used for both forward and backward sequential feature selection. A.R.H.

N79-27918# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
ON THE LEAST FAVORABLE CONFIGURATIONS IN CERTAIN TWO-STAGE SELECTION PROCEDURES
Shanti S. Gupta and Klaus-J. Miescke Apr. 1979 21 p refs
(Contract N00014-75-C-0455)
(AD-A068671; Mimeograph-Ser-79-6) Avail: NTIS HC A02/MF A01 CSCL 12/1

The problem of finding the least favorable configuration for selecting the best of k populations i.e. the one with the largest location parameter by use of six different two-stage selection procedures is considered. Each of the six procedures consists of a subset selection (screening) rule at the first stage followed by another rule based on (the first stage and) additional samples from the selected populations to decide finally which of the selected populations is the best. In the indifference-zone approach it is (or was) conjectured that the least favorable parameter configuration is of the slippage type. It is shown that this conjecture is true for four of these procedures. For a fifth procedure it is proved that at least a certain lower bound of the probability of a correct selection has this property which is analogous to the result of Tamhane and Bechhofer (1979) concerning the sixth procedure. GRA

N79-27919# Laboratorium fuer Betriebsfestigkeit, Darmstadt (West Germany).
COMPUTATION OF THE IRREGULARITY FACTOR N sub 0/N sub 1 OF A STATIONARY GAUSSIAN PROCESS WITH DUAL PEAK POWER SPECTRAL DENSITY
E. Haibach and U. Wendt Dec. 1977 36 p refs In GERMAN; ENGLISH summary Sponsored by Deut. Forschungsgemeinschaft
(LBF-TB-137) Avail: NTIS HC A03/MF A01

A Gaussian random signal for which the power spectral density function shows a dual peak can be produced by means of two bandpass filters and two random signal generators. The irregularity factor of such signals was computed for typical filter characteristics as a function of the distance of the peak center frequencies. The results obtained for different values of the relative band widths, of the attenuation, and of the intensity of the two bandpass signals are shown in diagrams. The attainable variations of the irregularity factor are discussed with reference to applications in random fatigue testing. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N79-27920# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
INDUCTION OF DECISION RULES [INDUCAO DE REGRAS DE DECISAO]
Orion deOliveiraSilva May 1979 21 p refs In PORTUGUESE; ENGLISH summary
(INPE-1492-RPE/036) Avail: NTIS HC A02/MF A01

The induction problem applied to decision rules is treated. The problem is divided in three parts: (1) change a given set of decision rules into a new set, including an induced rule; (2) change this set (including the induced rule) into a single rule; and (3) attribute a degree of certainty to this single rule. S.E.S.

N79-27921# Brookhaven National Lab., Upton, N. Y.
ALTERNATIVE, SEMI-AUTOMATED METHOD FOR PERFORMING MULTIOBJECTIVE ANALYSES
J. Schank Aug. 1978 99 p refs
(Contract EY-76-C-02-0016)
(BNL-50892) Avail: NTIS HC A05/MF A01

An automated methodology to characterize the quality of an energy system was developed. Both the previous and automated procedures are executed upon variants of the 1985 and 2000 National Energy Plan scenarios and the respective results are compared. DOE

N79-27922# Forschungsinstitut fuer Hochfrequenzphysik, Werthhoven (West Germany).
SPECTRAL ANALYSIS USING THE KARHUNEN-LOEVE TRANSFORM
J. Ziegenbein Jul. 1978 37 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Verteidigung
(Rept-7-78) Avail: NTIS HC A03/MF A01

A method for estimating the power spectrum of bandlimited stochastic processes that consist of a (spectrally) flat process plus a number of narrowband (i.e. periodic) processes is described. The method makes use of the orthogonal decomposition of the autocorrelation function using the Karhunen-Loeve transform in a discrete version. Besides outlining the principle of the method some results that were derived from simulations are given, thus describing the resolution capabilities of the method.
Author (ESA)

N79-27075*# Corning Glass Works, N.Y.
A MONTE CARLO APPROACH TO COMPETITION STRATEGY
Michael P. Teter *In* NASA. Langley Res. Center Sci. and Technol. of Low Speed and Motorless Flight Jun. 1979 p 389-397 (For primary document see N79-27070 18-01)
Avail: NTIS HC A99/MF A01 CSCL 12B

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N79-27923 California Univ., Los Angeles.
HARDY CLASSES ON RIEMANN SURFACES Ph.D. Thesis
Mikihiro Hayashi 1979 153 p
Avail: Univ. Microfilms Order No. 7915666

The algebra H to infinity (R) of all bounded analytic functions, linear extremal problems and the classification of invariant subspaces are discussed. Dissert. Abstr.

N79-27924# Texas Univ. at Austin. Center for Cybernetics Studies.
A DUALITY THEORY FOR A CLASS OF PROBLEMS WITH ESSENTIALLY UNCONSTRAINED DUALS
Aharon Ben-Tal (Technion - Israel Inst. of Technol., Haifa), Y. Barazilai (Technion - Israel Inst. of Technol., Haifa), and Abraham Charnes Jan. 1979 34 p refs
(Contracts N00014-75-C-0616; N00014-75-C-0569; NR Proj. 047-021)
(AD-A067755; CCS-330) Avail: NTIS HC A03/MF A01 CSCL 12/1

The paper introduces a class of linearly constrained convex programs whose duals are unconstrained in the sense that their solution must be in the interior of the feasible region. A complete duality theory is developed for these problems. Several examples are discussed. Author (GRA)

N79-27925# Wisconsin Univ. - Madison. Mathematics Research Center.
ON POINTWISE AND ANALYTIC SIMILARITY OF MATRICES
Shmuel Friedland Feb. 1979 27 p refs
(Contract DAAG29-75-C-0024)
(AD-A068866; MCR-TSR-1928) Avail: NTIS HC A03/MF A01 CSCL 12/1

The matrix problem considered in this paper arises when studying systems of ordinary differential equations in boundary-layer situations. A simple example is the behavior of solutions of epsilon y plus py prime plus gy = 0 (*) as epsilon approaches 0. In the general situation, a system of first order equations is considered, A(epsilon)y prime plus Cy = 0, where A,B are n x n matrices. The first step is to simplify the system using a similarity transformation, i.e., we set A = (1/T)z and multiply through by T, replacing the system by TA(epsilon)(1/T)x prime plus TC(1/T)x = 0. The matrix T is chosen so as to simplify the coefficient of the derivative. GRA

N79-27926# Fondazione Ugo Bordoni, Rome (Italy).
CALCULATION OF FUNCTIONS OF SOME PARTICULAR MATRICES [CALCOLO DI FUNZIONI PARTICOLARI MATRICI]
Pietro Filipponi Mar. 1977 15 p refs In ITALIAN
(FUB-11-1977) Avail: NTIS HC A02/MF A01

A particular class of matrices was studied, and some properties were deduced. Some functions of those matrices are expressable as polynomials of grade K on the same matrix, where K < NU and NU is equal to or less than N, N being the order of the matrix and NU a parameter related to the order of the larger sub-matrix present in the canonic Jordan form in which that matrix can be expressed. The given expressions, easy to introduce in a computer program, are useful as a validity test for matrix function calculation programs. Author (ESA)

N79-27927# Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
ON THE GAUSSIAN MEASURE OF SYMMETRIC CONVEX SETS
Christer Borell 1978 21 p refs
(CTH-Math-1978-10-2) Avail: NTIS HC A02/MF A01

The Gaussian measure of symmetric convex sets is discussed. The class of all mu-measurable seminorms on the underlying linear Hausdorff vector space E is also treated. Relevant theorems and their corollaries are elucidated. The investigation is also closely related to Gaussian zero sets and some properties of this class are listed. Author (ESA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N79-27928# Syracuse Univ., N. Y. Dept. of Electrical and Computer Engineering.
THE CAPACITANCE OF DISCS OF ARBITRARY SHAPE
Ephraim E. Okon and Roger F. Harrington Apr. 1979 85 p refs
(Contract N00014-76-C-0225)
(AD-A067758; TR-79-3; TR-10) Avail: NTIS HC A05/MF A01 CSCL 20/3

A method of moments procedure is presented for solving the integral equation satisfied by the electrostatic charge distribution over arbitrary planar domains. This procedure is based on a representation of such domains as a collection of quadrilateral subdomains, using the Gordon-Hall and Zienkiewicz-Phillips subdivision techniques. All integrals are effectively evaluated over triangles, and rely on an expression which is derived for the potential at a point due to a constant charge distribution over a triangular domain. As an illustration, the computational procedure is applied to a variety of discs. The computed results are in excellent agreement with the exact values for the circle and the ellipse, and are compared with known numerical values for certain other configurations. Author (GRA)

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N79-27929*# Virginia Univ., Charlottesville.
COMPUTATION OF MINIMUM NOISE AIRCRAFT LANDING TRAJECTORIES
Gerald Cook Langley Res. Center. NASA Jun. 1978 75 p refs
(Grant NsG-1388)
(NASA-CR-158931) Avail: NTIS HC A04/MF A01 CSCL 20A

Efforts to reduce aircraft noise perceived by residents during landing are reported. Steps in the development of the aircraft aerodynamic model, noise model, population model, performance index, and optimization procedure are reviewed. The optimal trajectories from the three main near-terminal entry points are presented via tables and graphs. The recommendation is that these minimal noise trajectories be tested as reference trajectories for the terminally configured aircraft to fly along. A.R.H.

N79-27930*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TRAILING EDGE NOISE DATA WITH COMPARISON TO THEORY
W. Olsen and D. Boldman 1979 30 p refs Presented at 12th Fluid and Plasma Dynamics Conf., Williamsburg, Va., 23-25 Jul. 1979; sponsored by AIAA
(NASA-TM-79208; E-093; AIAA-79-1524) Avail: NTIS HC A03/MF A01 CSCL 20A

The noise emission generated by the passage of a turbulent airstream over the trailing edge of a semi-infinite plate was measured over a large range of airstream velocity and plate geometry. The experiment was designed to validate trailing edge noise theories. The results show that the peak of the radiation pattern moves from an upstream to a downstream direction as the velocity increases. The measured radiation pattern of the noise was in excellent agreement with that predicted by the recent theory of Goldstein. As predicted, the pattern shape was independent of the nature of the turbulence producing the noise. Author

N79-27931*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN EXPERIMENTAL STUDY OF SOUND RADIATION FROM HYPERBOLOIDAL INLET DUCTS

Lorenzo R. Clark and Y. C. Cho Jun. 1979 19 p ref Presented at the 97th meeting of the Acoustical Soc. of America, Cambridge, Mass., 11-15 Jun. 1979
(NASA-TM-80109) Avail: NTIS HC A02/MF A01 CSCL 20A

Sound radiation from hyperboloidal inlet ducts which include a circular cylinder with plane baffle as a limiting case was investigated. Results include the polar angle variation of the pressure level and the phase of the radiated field for various frequencies and various modes incident which were produced using an electronically operated mode synthesizer. Good agreement with a rigorous theoretical prediction was found. A.R.H.

N79-27932*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE ATTENUATION OF SOUND BY THREE-DIMENSIONALLY SEGMENTED ACOUSTIC LINERS IN A RECTANGULAR DUCT
W. Koch (Institut fuer Theoretische Stroemungsmechanik, DFVLR/AVA, Goettingen, Germany) Jun. 1979 29 p
(NASA-TM-80118) Avail: NTIS HC A03/MF A01 CSCL 20A

Axial segmentation of acoustically absorbing liners in rectangular, circular or annual duct configurations is a very useful concept for obtaining higher noise attenuation with respect to the bandwidth of absorption as well as the maximum attenuation. As a consequence, advanced liner concepts are proposed which induce a modal energy transfer in both cross-sectional directions to further reduce the noise radiated from turbofan engines. However, these advanced liner concepts require three-dimensional geometries which are difficult to treat theoretically. A very simple three-dimensional problem is investigated analytically. The results show a strong dependence on the positioning of the liner for some incident source modes while the effect of three-dimensional segmentation appears to be negligible over the frequency range considered. A.R.H.

N79-27933*# Lockheed-Georgia Co., Marietta.
STUDIES OF THE ACOUSTIC TRANSMISSION CHARACTERISTICS OF COAXIAL NOZZLES WITH INVERTED VELOCITY PROFILES: COMPREHENSIVE DATA REPORT Final Report
P. D. Dean, M. Salikuddin, K. K. Ahuja, H. E. Plumblee, and P. Mungur May 1979 182 p ref
(Contract NAS3-20797)
(NASA-CR-159628) Avail: NTIS HC A09/MF A01 CSCL 20A

The efficiency of internal noise radiation through a coannular exhaust nozzle with an inverted velocity profile was studied. A preliminary investigation was first undertaken (1) to define the test parameters which influence the internal noise radiation; (2) to develop a test methodology which could realistically be used to examine the effects of the test parameters; and (3) to validate this methodology. The result was the choice of an acoustic impulse as the internal noise source in the jet nozzles. Noise transmission characteristics of a coannular nozzle system were then investigated. In particular, the effects of fan convergence angle, core extension length to annulus height ratio and flow Mach numbers and temperatures were studied. Relevant spectral data only is presented in the form of normalized nozzle transfer function versus nondimensional frequency. A.R.H.

N79-27934*# General Electric Co., Evendale, Ohio. Aircraft Engine Group.
ANALYSIS, DESIGN, AND TEST OF ACOUSTIC TREATMENT IN A LABORATORY INLET DUCT
R. E. Kraft, R. E. Motsinger, W. H. Gauden, and J. F. Link Jul. 1979 81 p refs
(Contract NAS1-14847)
(NASA-CR-3161) Avail: NTIS HC A05/MF A01 CSCL 20A

A suppression prediction program based on the method of modal analysis for spinning mode propagation in a circular duct was used in the analytical design of optimized, multielement, Kevlar bulk-absorber treatment configurations for an inlet duct. The NASA-Langley ANRL anechoic chamber using the spinning mode synthesizer as a sound source was used to obtain in-duct spinning mode measurements, radial mode measurements, and far-field traverses, as well as aerodynamic measurements. The measured suppression values were compared to predicted values, using the in-duct, forward-traveling, radial-mode content as the source for the prediction. The performance of the treatment panels was evaluated from the predicted and measured data. Although experimental difficulties were encountered at the design condition, sufficient information was obtained to confirm the expectation that it is the panel impedance components which are critical to suppression at a single frequency, not the particular construction materials. The agreement obtained between measurement and prediction indicates that the analytical program can be used as an accurate, reliable, and useful design tool. A.R.H.

N79-27935# Army Missile Research and Development Command, Redstone Arsenal, Ala. Technology Lab.
ACOUSTICAL SPECKLE INTERFEROMETRY
John Arnold Schaeffel, Jr. 22 Mar. 1979 102 p refs
(AD-A067664; DRDMI-T-79-39) Avail: NTIS HC A06/MF A01 CSCL 20/1

When a continuous wave or pulsed beam of ultrasound is scanned over an object an echo from the object may be detected. If the echo has a random variation in amplitude versus position of the beam, the resulting variation is referred to as acoustical speckle. An analysis is presented for using acoustical speckle to determine displacements on the surface or interior to an object. Two experimental configurations, pulse-echo scanning and continuous wave scanning, are treated in the verification of the analysis. Six experiments are conducted using numerical cross-correlation analysis to verify the hypothesis that acoustical speckle interferometry may be used to determine displacements. The experiments indicate that displacements as small as the discrete sampling interval of the ultrasonic beam can be predicted. Pulse-echo scanning is found to be sensitive to motion in three-dimensions while continuous wave (CW) scanning is sensitive to motion primarily in two-dimensions. Both methods of beam scanning produce excellent results for interferometric displacement analysis. Author (GRA)

N79-27936# Woods Hole Oceanographic Institution, Mass.
RAY CALCULATIONS OF OCEAN SOUND CHANNELS USING A POCKET PROGRAMMABLE CALCULATOR AND EXTENDED FORMS OF THE HIRSCH-CARTER MATHEMATICAL MODEL WITH TABLES OF THE INCOMPLETE BETA FUNCTION
Lincoln Baxter, II Oct. 1978 83 p refs
(Contract N00014-77-C-0196)
(AD-A069168; WHOI-78-65) Avail: NTIS HC A05/MF A01 CSCL 20/1

Formulas for curve fitting and ray computation using compound models made up of several different layers are presented. Examples of computation by pocket programmable calculator on two Sargasso Sea profiles, one from the center of a cold ring eddy are given. Necessary tables of the incomplete beta-function and calculator programs are included in a supplement. GRA

N79-27937# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
ACOUSTIC EMISSION SOURCES IN BRITTLE SOLIDS
A. G. Evans 1978 22 p refs Presented at the 96th Meeting of the Acoustical Soc. of America, Honolulu, Hawaii, 27 Nov. 1978
(Contract W-7405-eng-48)
(LBL-8335; Conf-781186-2) Avail: NTIS HC A02/MF A01

Microcrack sources and sources that accompany macrocrack extension were studied. The emission amplitude distributions are derived using crack opening displacement solutions pertinent to each source type, and assuming an extreme value size distribution of precursors consistent both with the functional form of typical emission amplitude distributions and with defect size observations. Acoustic emission event rates are derived from the stress and time dependence of crack growth. Stress history effects are afforded particular emphasis. Some applications of acoustic emission that emerge from the analysis of the source characteristics are evaluated. DOE

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N79-27938 California Univ., Berkeley.
A SURVEY OF SOME RECENT MATHEMATICAL RESULTS IN ATOMIC AND MOLECULAR QUANTUM MECHANICS Ph.D. Thesis
John Davids Morgan, III 1978 104 p
Avail: Univ. Microfilms Order No. 7914704

A review of the progress made by the author and his colleagues in three areas of atomic and molecular quantum mechanics is presented. The three areas are: (1) the asymptotic behavior of bound atomic and molecular eigenfunctions; (2) molecular potential energy curves; and (3) the increase of atomic ionization energies as electrons are removed. Dissert. Abstr.

N79-27939 Rochester Univ., N. Y.
ORBITAL INTERACTIONS IN MOLECULES STUDIED BY ULTRAVIOLET PHOTOELECTRON SPECTROSCOPY Ph.D. Thesis
Paul Joseph Milazzo 1979 146 p
Avail: Univ. Microfilms Order No. 7914485

The spectra of some transition metal carbonyl complexes were examined to assign and characterize the molecular orbitals resulting from the metal-halogen or metal-metal bonds. The series Re(CO)5X (X=Cl,Br,I) was examined and a new orbital assignment proposed which differed from earlier results on the analogous manganese series. The isoelectronic series W(CO)4(NO)X was also studied and compared with the Re series. The same orbital assignments were made. The metal-metal bonding in a series of polynuclear transition metal carbonyl complexes (Re2(CO)10, MnRe(CO)10, FeRe2(CO)14, Ru3(CO)12, Os3(CO)12) was examined. The pi orbitals in a series of phenylcycloalkenes and of phenylcyclopropenes were also monitored. Dissert. Abstr.

N79-27940 Yale Univ., New Haven, Conn.
DYNAMICS OF MOLECULAR PHOTODISSOCIATION Ph.D. Thesis
Peter Michael Kroger 1978 210 p
Avail: Univ. Microfilms Order No. 7916618

Photofragment spectroscopy at a wavelength of 266 nm was used to investigate the molecular dynamics of the photodissociation of several polyatomic molecules. Acetyl iodide and trifluoroacetyl iodide are both found to undergo a three-body photodissociation to yield iodine, methyl, and CO fragments in the former case and iodine, trifluoromethyl, and CO fragments in the latter. A dynamical model based upon the formation of a long-acetyl radical is used to explain the results of the acetyl iodide experiments. The results of the trifluoroacetyl iodide experiments, however, were found not to be in accord with the predictions of such a model. The results of experiments on three polyhalide molecules: tin tetrabromide, methylene iodide, and uranium hexafluoride are reported. Dissert. Abstr.

N79-27941 Iowa State Univ. of Science and Technology, Ames.
A SYSTEMATIC DETERMINATION OF EXTENDED ATOMIC ORBITAL BASIC SETS AND APPLICATION TO MOLECULAR SCF AND MCSCF CALCULATIONS Ph.D. Thesis
David Francis Feller 1979 115 p
Avail: Univ. Microfilms Order No. 7916192

The behavior of the two exponential parameters in an even-tempered Gaussian basis set is investigated as the set optimally approaches an integral transform representation of the radial portion of atomic and molecular orbitals. This approach permits a highly accurate assessment of the Hartree-Fock limit for atoms and molecules. In an effort to expedite calculations with very large primitive basis sets, a procedure is described which avoids computing the numerous, multicenter, two-electron repulsion integrals to the same degree of accuracy as the one-center integrals. A small, fitted basis is used to compute the multicenter integrals. Reductions in the time required for integral evaluation of from 10:1 to 80:1 are realized with a loss in accuracy of the final computed energy within several milli-Hartrees. The effects of basis set truncation on correlated calculations for the HNO system are studied as they influence the three lowest states of that molecule. Dissert. Abstr.

N79-27942 California Univ., Santa Barbara.
EXCHANGE PERTURBATION THEORIES APPLIED TO ELECTRON-HYDROGEN ATOM SCATTERING Ph.D. Thesis
Carol Ann Venanzi 1978 101 p
Avail: Univ. Microfilms Order No. 7915629

A perturbation method for calculating elastic scattering phase shifts is presented. Two exchange perturbation theories (the Murrell-Shaw-Musher-Amos (MSMA) theory and the Distinguishable Electron Method (DEM)) are used to calculate phase shifts through second order. Their relative merits are compared for the elastic scattering of s-wave electrons from hydrogen at low energies. The MSMA and DEM singlet phase shifts are competitive with the results of other approaches (minimum norm, polarized orbital, close-coupling, and Fredholm determinant). However, the triplet results do not compare favorably with even the simple static exchange approximation. The zeroth-order triplet phase shifts could fall arbitrarily close to the exact value. Further studies in the triplet case are indicated. Perhaps a static exchange (rather than a square-well) zeroth-order model would be more appropriate to the triplet case. Dissert. Abstr.

N79-27943 Pennsylvania Univ., Philadelphia.
THEORETICAL ASPECTS OF THE RESONANT SCATTERING OF LIGHT BY MOLECULES Ph.D. Thesis
Frank Adam Novak 1977 143 p
Avail: Univ. Microfilms Order No. 7806626

Analysis of the resonant scattering of light from isolated molecules in weak fields reveals a new interaction picture which separates the modes of the exciting light from those modes into which the light is scattered. This procedure allows a rigorous description of damping phenomena and also allows a proper quantum optical description of the exciting light source. It is found that the mathematics of this analysis is isomorphic to the mathematics of some recent less physical theories and justifies their use. Two different approaches are taken in describing resonant light scattering from molecules undergoing random perturbations. The first approach uses a semiclassical theory where the random perturbations are taken into account using a phenomenological stochastic Hamiltonian. In the second, the lineshape of the scattered light is calculated for a two-level system using a quantum statistical procedure based on the reduced density matrix. Dissert. Abstr.

N79-27944*# Rochester Univ., N. Y. Dept. of Chemistry.
SEMICLASSICAL THEORY OF ELECTRONICALLY NON-ADIABATIC TRANSITIONS IN MOLECULAR COLLISION PROCESSES
Kai S. Lam and Thomas F. George 1979 83 p refs Presented at Proc. of the NATO Advanced Study Inst. on Semiclassical Methods in Scattering and Spectroscopy, 1979
(Grant NsG-2198; Contract F49620-78-C-0005; Grant NSF CHE-77-27826)
(NASA-CR-158776) Avail: NTIS HC A05/MF A01 CSCL 07D

An introductory account of the semiclassical theory of the S-matrix for molecular collision processes is presented, with special emphasis on electronically nonadiabatic transitions. This theory is based on the incorporation of classical mechanics with quantum superposition, and in practice makes use of the analytic continuation of classical mechanics into the complex space of time domain. The relevant concepts of molecular scattering theory and related dynamical models are described and the formalism is developed and illustrated with simple examples - collinear collision of the A+BC type. The theory is then extended to include the effects of laser-induced nonadiabatic transitions. Two bound continuum processes collisional ionization and collision-induced emission also amenable to the same general semiclassical treatment are discussed. A.R.H.

N79-27945# Lowell Univ. Research Foundation, Mass.
COMPUTATION OF H2O QUADRUPOLE MOMENT MATRIX ELEMENTS FOR PRESSURE BROADENING CALCULATIONS
Richard W. Davies Jan. 1979 49 p refs

(Contract F19628-77-C-0053; AF Proj. 2310)
(AD-A068569; ULRF-400/CAR; SCIENTIFIC-2; AFGL-TR-79-0035) Avail: NTIS HC A03/MF A01 CSCL 20/10

Recent tunable laser measurements indicate that theoretical linewidths, calculated for H2O self-broadened transitions and based solely on the effects of dipole-dipole collisions, are too small at high and intermediate J values. This suggests neglect of other important scattering mechanisms, such as dipole-quadrupole interactions. This report discusses computational procedures necessary to obtain quadrupole moment matrix elements for H2O and other asymmetric rotor molecules. Computer programs to obtain these matrix elements have been constructed and are presently operational. Numerical results for some low J quadrupole transitions are presented in Appendix B of the report. GRA

N79-27946# Bell Telephone Labs., Inc., Murray Hill, N. J.
MUON SPIN ROTATION (MUON SR)
A. T. Fiory, K. G. Lynn (BNL, Upton, N. Y.), and W. J. Kossler (Coll. of William and Mary) 1978 12 p refs Presented at Workshop on the AGS Fixed Target Res. Program, Upton, N. Y., 8 Nov. 1978
(Contract EY-76-C-02-0016)
(BNL-25216; Conf-781184-1) Avail: NTIS HC A02/MF A01

The scope and interest in developing a high flux beam of polarized low energy muons for muon SR at the AGS are discussed. Essentials of the measurement technique are given, and the kind of work possible is illustrated with two examples taken from experiments on solids carried out at SKEL. The muon SR measurement technique, solid state applications of diffusion of muons in metals and detection of magnetic ordering in spin glass are described. DOE

N79-27947# Los Alamos Scientific Lab., N. Mex.
FERMION HAMILTONIANS WITH MONOPOLE AND QUADRUPOLE PAIRING
J. N. Ginocchio 1978 11 p refs
(Contract W-7405-eng-36)
(LA-UR-79-241) Avail: NTIS HC A02/MF A01

Shell model Hamiltonians which have a set of eigenstates made up of only monopole and quadrupole pairs are presented. These Hamiltonians have many other types of states as well. The subspace of states made up of monopole and quadrupole pairs have a one-to-one correspondence to states made up of monopole and quadrupole bosons. Some properties of these Hamiltonians are discussed. DOE

N79-27948# Brookhaven National Lab., Upton, N. Y.
REVIEW OF NEUTRINO PHYSICS AT BROOKHAVEN
1978 33 p refs Presented at Workshop on the AGS Fixed Target Res. Program, Upton, N. Y., 8 Nov. 1978
(Contract EY-76-C-02-0016)
(BNL-25378; Conf-781184-3) Avail: NTIS HC A03/MF A01

A few topics are discussed to illustrate both the problems inherent in medium energy neutrino physics and future prospects. The event rates and current experiments, are reviewed. Neutral current interactions, elastic neutrino scattering from electrons and protons, single pion production, and the associated searches for charmed baryon production and dilepton events are covered. DOE

N79-27949# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
CONSTRUCTION AND SETTING UP OF A LAMELLAR GRATING WITH A VERY WIDE SPECTRAL RANGE AND ITS USE AS A FOURIER SPECTROMETER FOR ASTROPHYSICAL MEASUREMENTS ON LARGE MOLECULES [KONSTRUKTION UND BAU EINES LAMELLENGITTERS MIT EXTREM GROSSEMSBPEKTRALBEREICH UND DESSEN VERWENDUNG ALS FOURIER SPEKTROMETER ZUR MESSUNG ASTROPHYSIKALISCH WICHTIGER MOLEKUELE]
Reiner Hofmann Sep. 1978 134 p refs In GERMAN
(MPI-PAE/Extraterr-144) Avail: NTIS HC A07/MF A01

This instrument covers a wider spectral range than a Michelson interferometer and does not suffer from polarization effects. Coherent optics theory is used to calculate boundary conditions for maximum modulation. A 50 to 500 per cm wavenumber region can be covered for astronomical observations not exceeding one milli sq cm delta t. The grating constant is 0.5 cm and the resolution 0.05/cm. Two specific examples are investigated. These are measurement of the relative transmission and spectral resolution of a Fabry-Perot interferometer and determination of the Coriolis factors associated with the nu sub(8) vibration-rotation CH 3 CN band. Author (ESA)

N79-27950# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
FORMATION OF DIMERS IN RARE GAS BEAMS FROM NOZZLES Thesis - Goettingen Univ., West Ger. [BILDUNG VON DIMEREN IN EDELGAS DUESENSTRAHLEN]
Hans Dieter Meyer Apr. 1978 167 p refs In GERMAN
(MPIS-5/1978) Avail: NTIS HC A08/MF A01; Max. Planck Inst. fuer Stroemungsforsch., Goettingen, West Ger. DM 27,75

An extensive theoretical treatment of the problem is presented. It is seen that two atoms forming a metastable complex orbital are stabilized by collision with a third particle. Equilibrium constants associated with these orbitals are calculated using both quantum mechanics and classical theory. Experiments performed with Ne and Ar are described. Comparisons are made between theoretically derived dimerization concentrations and those obtained from experiments. Author (ESA)

N79-27951# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
TOTAL SCATTERING CROSS SECTIONS FOR He(2(1)S, 2(3)S) ON He, Ne, Ar, Kr IN THE THERMAL ENERGY REGION [TOTALE STREUQUERSCHNITTE FUER He(21S, 23S)-He, Ne, Ar, Kr IM THERMISCHEN ENERGIERBEREICH]
Harald Kirst May 1978 116 p refs In GERMAN
(MPIS-7/1978) Avail: NTIS HC A06/MF A01; Max. Planck Inst. fuer Stroemungsforsch., Goettingen, West Ger. DM 20,10

The apparatus and techniques used to determine the dependence of the total cross sections for interactions between excited He and ground state rare gas atoms on velocity is described. The existence of a Van der Waal minimum was experimentally confirmed. Comparisons are made between experimentally measured values and those obtained theoretically (potential model). Author (ESA)

N79-27952# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
MEASUREMENTS OF DIFFERENTIAL CROSS SECTIONS FOR ELECTRONIC EXCITATIONS ON Na-Hg K-Hg, AND Cs-Hg SYSTEMS [MESSUNGEN DIFFERENTIELLER WIRKUNGSQUERSCHNITTE FUER ELEKTRONISCHE ANREGUNG AN DEN SYSTEMEN Na-Hg K-Hg UND Cs-Hg]
Eckhard Schaedlich Jul. 1978 76 p refs In GERMAN
(MPIS-13/1978) Avail: NTIS HC A05/MF A01; Max-Planck Inst. fuer Stroemungsforsch., Goettingen, West Ger. DM 14,10

Collision induced electronic excitations were investigated in the 70 to 200 eV (laboratory system) range with time-of-flight analysis techniques. Differential elastic and inelastic cross sections for the P excitation of the alkali atoms were determined in the 1 to 30 deg region (laboratory system). Comparisons are made with the results of semiclassical calculations (landau-Zener-Stueckelberg formulas, Coriolis coupling) and a phenomenological potential model is developed. Author (ESA)

N79-27953# Rome Univ. (Italy). Ist. di Fisica.
DETERMINATION OF NYK COUPLING CONSTANTS BY THE HABER-SCHAIM METHOD
B. Diclaudio and G. Violini 2 Apr. 1978 7 p refs Prepared in cooperation with Ist. Nazl. di Fis. Nucl., Rome Submitted for publication
(Rept-87) Avail: NTIS HC A02/MF A01

The Haber-Schaim method is applied to determine the NYK coupling constants. The result is in fair agreement with SU(3), but some inconsistency is pointed out with the KN low-energy parameterization. Author (ESA)

N79-27954# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.
RESEARCH ACTIVITIES OF THE RADIATION LABORATORY

Annual Report, 1977 [ATTIVITA SVOLTA DAL LABORATORIO DELLE RADIAZIONI]
A. Rogani 31 Mar. 1978 47 p refs In ITALIAN; ENGLISH summary
(ISS-R-78/6) Avail: NTIS HC A03/MF A01

A detailed survey of all activities is presented. Research programs range from nuclear and atomic physics to biophysics and the physics of condensed matter. This fundamental scientific research is intended as the necessary cultural background for carrying out the Laboratory's responsibility for monitoring and assessing the impact of both ionizing and nonionizing radiation on public health and the environment. Author (ESA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N79-27955 North Carolina State Univ. at Raleigh.
SURFACE FLASHOVER CHARACTERISTICS OF ALUMINA DIELECTRIC GUIDE CATHODES IN AN INTENSE RELATIVISTIC ELECTRON BEAM ACCELERATOR Ph.D. Thesis
Ray Modez Stringfield, Jr. 1978 199 p
Avail: Univ. Microfilms Order No. 7915548

The surface flashover characteristics of alumina (Al2O3) dielectric guide cathodes were experimentally observed and interpreted in light of the mechanism of surface charging. Alumina rods with and without a coating of Cr2O3 were studied. Measurements of the temporal behavior of the discharge, including the time of breakdown, and the propagation velocity of the flashover light front along the rod length were made, as well as observations of the reproducibility of the flashover path over many discharges. A method of timing fast events is presented which can be used when the experimental conditions preclude more conventional methods of measurement. Dissert. Abstr.

N79-27956 Yale Univ., New Haven, Conn.
INCLUSIVE PROMPT MUON AND DIMUON PRODUCTION BY 28.5 GeV PROTONS Ph.D. Thesis
Diane Mary Grannan 1978 131 p
Avail: Univ. Microfilms Order No. 7916501

The inclusive production of single prompt muons and muon pairs from the interaction of 28.5 GeV protons with nuclear targets was investigated. The ratio of single prompt muons to mesons produced in the fragmentation region was compared with data at 400 GeV and found to be independent of the proton energy. Measurements of the intensity of muon pairs generated in wolfram, iron, and carbon targets established the A-dependence of the production. A high resolution measurement of the low mass dimuon spectrum yielded a continuum similar to that observed at 150 GeV, demonstrating the scaling of the differential cross section d epsilon/dxdM in dimuon production. Dissert. Abstr.

N79-27957 Columbia Univ., New York.
PROPAGATION OF FERMIONS IN (A SUB 0)=0 GAUGE Ph.D. Thesis
Sally Etherton Cummins 1979 54 p
Avail: Univ. Microfilms Order No. 7916397

In A sub 0=0 gauge in QED, the Ward-Takahashi identity implies the nonpropagation of the Fermi field (psi). This is shown to be a valid conclusion, both by using functional integration and by perturbation theory. Since Greeen's functions are gauge dependent, this does not, however, imply the immobility of spin - 1/2 fields. Two types of composite fields are exhibited for which the field psi is dressed with longitudinal, non-observable photons. For these fields, no implications about their propagators can be drawn from the W-T identity, which for these fields is trivially zero. It is shown by functional integration and by perturbation theory that these fields can propagate, and interact with the photon field with the usual P 1/sq K sub 0 factor of A sub 0=0 gauge. Dissert. Abstr.

N79-27958# Department of Energy, Washington, D. C. Office of Nuclear Waste Management.
DOE PROGRAM FOR IMPROVEMENT PRACTICES FOR SHALLOW BURIAL OF RADIOACTIVE WASTE
James E. Dieckhoner 1978 18 p refs Presented at Environ. Control Symp., Wash., D. C., 28 Nov. 1978
(Contract EY-76-C-07-1570)
(CONF-781109-25) Avail: NTIS HC A02/MF A01

The practice of burying solid radioactive waste in relatively shallow pits or trenches at government nuclear sites dates back to the Manhattan Project. In some cases, where local conditions were considered unfavorable, intersite shipment of waste was required. This general concept was later used at commercially-operated sites under Federal or state regulation. The purpose, scope, and results of a DOE program begun several years ago for improvements of burial ground disposal methods are reviewed. The program included the re-evaluation of the original siting and of operating practices at existing burial grounds (including monitoring for migration of activity); the development of improved criteria for siting of new grounds that might be required as the defense site operations continue; and development of corrective measures such as diking and better draining for possible unsatisfactory conditions that might be detected. The possible applications of these findings to commercial burial grounds is discussed. DOE

N79-27959# Rochester Univ., N. Y.
NUCLEAR STRUCTURE THEORY Annual Technical Progress Report, 1 Oct. 1977 - 30 Sep. 1978
J. B. French and D. S. Koltun 1978 12 p refs
(Contract EY-76-S-02-2171)
(COO-2171-182; UR-671) Avail: NTIS HC A02/MF A01

Progress in the following areas of nuclear structure and reaction theory is summarized: statistical spectroscopy, including random matrix methods, with applications to fluctuations in spectra and in strength distributions, and to problems of erogodicity; group symmetries in spectral distribution theory; effective interactions; statistical reaction theory, applied to 'deep inelastic' collisions of heavy ions, and to pion absorption by nuclei; meson scattering and absorption by nuclei, including general scattering theory with absorption, multiple scattering theory and its reactive content, models for absorption, theory of the absorption operator (pion NN vertex), theory of pion N scattering. A list of publications is included. DOE

N79-27960# Ohio State Univ. Research Foundation, Columbus.
HIGH ENERGY PHYSICS STUDIES. PART 1: EXPERIMENTAL PROGRAM. PART 2: THEORETICAL PROGRAM Progress Report
T. A. Romanowski, K. Tanaka, and W. W. Wada 1978 68 p refs
(Contract EY-76-C-02-1545)
(COO-1545-243) Avail: NTIS HC A04/MF A01

Progress is reported in the following areas: (1) measurement of decay lifetimes with tagged emulsion of charged particles produced by high energy neutrinos; (2) measurement of prompt neutrino production; (3) search for parity violation in scattering of polarized protons; (4) trimuon events; and (5) analysis of data on meson production from experiments with charged and neutral spectrometers. Various topics in particle theory are also discussed. These include discrete symmetries which may determine quark masses in the SU(2) x U(1) model, Higgs boson production in pp collisions, study of Lagrangians with gauge and Higgs scalar fields, and Faddeev-Popov determinants as related to quantum chromodynamics. DOE

N79-27961# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
GEOHYDROLOGIC INVESTIGATIONS OF BURIED METAMORPHIC ROCK AND MUDSTONE FOR THE STORAGE OF RADIOACTIVE WASTE
I. W. Marine 1979 12 p refs Presented at Workshop on Low-Flow Low Permeability Measurements in Langley Impermeable Rocks, Paris, 19-21 Mar. 1979
(Contract AT(07-2)-1)
(DP-MS-79-13; Conf-790320-1) Avail: NTIS HC A02/MF A01

A geohydrologic investigation of crystalline metamorphic rock

and Triassic mudstone was carried on at the Savannah River Plant near Aiken, South Carolina, U.S. to determine the feasibility of storing radiactive waste in these host rocks. The concepts, testing methods, and results are described in terms of application to other locations for geologic storage of radioactive waste. DOE

N79-27962# California Univ., Livermore. Lawrence Livermore Lab.
PROBABILISTIC SAFETY ANALYSIS FOR SOLIDIFIED HIGH-LEVEL NUCLEAR WASTE MANAGEMENT SYSTEMS Status Report
Richard A. Heckman and Thomas Holdsworth Feb. 1979 293 p refs
(Contract W-7405-eng-48)
(NUREG-CR-0577; UCRL-52632) Avail: NTIS HC A13/MF A01

Those characteristics of solidified high-level waste which influence radiological risk during both the preemplacement portion of the waste management system and the repository postsealing period are discussed with emphasis on reducing the uncertainties associated with the analyses of the chemical and physical processes involved in the waste management system. DOE

N79-27963# National Academy of Sciences - National Research Council, Washington, D. C.
RADIOACTIVE WASTES AT THE HANFORD RESERVATION: A TECHNICAL REVIEW
1978 285 p refs
(Contract EY-76-C-02-2708)
(COO-2708T004-1; LC-78-52310; ISBN-0-309-02745-4) Avail: NTIS HC A13/MF A01

Current practices and plans for the handling of the accumulated wastes from 30 years of Pu production at Hanford are presented. The high-level wastes amount to more than 50 million gallons of solids and liquids containing amounts of radioisotopes comparable to the entire world-wide fallout from nuclear weapons tests. Presently there is not a significant radiation hazard to public health and safety from waste-management operations at Hanford. Current monitoring practices are judged adequate. Recommendations are given for processing and disposing of the wastes. Most soils and sediments containing less than 1 microcurie per gram of dispersed radioisotopes should be left in place. DOE

N79-27964# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
WASTE MANAGEMENT Quarterly Report, Apr. - Jun. 1978
1978 167 p refs
(Contract EY-76-C-09-0001)
(DPST-78-125-2) Avail: NTIS HC A08/MF A01

The following were studied: environmental impact of longterm management of high level radioactive waste at SRP (draft programmatic statement), Defense waste solidification facility, cost analysis of defense waste processing facilities, improved reference process for defense waste supernate clarification, removal of Sr-90 from waste supernate, removal of Al from sludges by caustic washing, ion chromatographic determination of nitrite, demonstration of large-scale calciner, radiolytic gas production from TRU waste in concrete, incorporation of TRU incinerator ash into glass, improved glass frit, test of small-scale joule-heated melter, evaluation of candidate alloys for in-can melting canisters, residual solids from Tank 16 annulus, waste monitors, chemical form of Pu in burial ground soil, alpha waste trench coring, corrosion of buried drums, radionuclide release and migration from buried wastes, ground water flow pattern from burial ground wells, and radionuclide uptake by pine trees from buried irradiated scrap metal. DOE

N79-27965# Du Pont de Nemours (E. I.) and Co., Aiken, S. C.
DEVELOPMENT OF GLASS COMPOSITIONS FOR IMMOBILIZATION OF SRP WASTE
M. J. Plodinec Feb. 1979 36 p refs
(Contract EY-76-C-09-0001)
(DP-1517) Avail: NTIS HC A03/MF A01

A composition of glass frit, termed 411, was developed for the immobilization of SRP high-level radioactive waste. In comparison with frit compositions previously studied, the new composition offers the following advantages: the amount of ferrite-spinel crystals formed is greatly decreased because the TiO2 content is much lower; a high lithium-to-sodium ratio decreases the viscosity of glass mixtures containing high aluminum waste. The compositional studies leading to the development of the improved glass are reported. DOE

N79-27966# Rice Univ., Houston, Tex. Bonner Nuclear Labs.
NUCLEAR STRUCTURE AT INTERMEDIATE ENERGIES Progress Report, 1 Apr. 1978 - 31 Mar. 1979
G. C. Phillips and G. S. Mutchler 1979 55 p refs
(Contract EY-76-C-05-1316)
(ORO-1316-201) Avail: NTIS HC A04/MF A01

Progress was made in data analysis and interpretation of a number of LAMPF experiments: E-80 (pi + scattering from nuclei), E-81 (pp and pd reactions), E-341 (pd yields dpi(+) n), E-82 (pi + -d reactions), and E-197 (pd yields Hepi-3). This analysis was aided by the start of operation of a new PDP 11/34 computer system. A list of publications is included. DOE

N79-27967# Dames and Moore, White Plains, N. Y.
TECHNICAL SUPPORT FOR GEIS: RADIOACTIVE WASTE ISOLATION IN GEOLOGIC FORMATIONS. VOLUME 20: THERMOMECHANICAL STRESS ANALYSIS AND DEVELOPMENT OF THERMAL LOADING GUIDELINES
Apr. 1978 239 p refs
(Contract W-7405-eng-26)
(Y/OWI/TM-36/20) Avail: NTIS HC A11/MF A01

To supplement the Draft Generic Environmental Impact Statement on Commercial Waste Management, thermomechanical analysis of proposed preconceptual repositories in granite, shale and basalt was conducted on three different levels of scale (1) very near field (canister scale), (2) near field (excavation scale) and (3) far field (regional scale) studies. Three numerical methods were used to undertake the thermomechanical calculations; namely, the finite element method for thermal stress analysis, the boundary element method for thermal and thermal stress analysis and the semi-analytical method also for thermal and thermal stresses analysis. From the thermomechanical studies with simplifying assumptions on rock mass behavior where applicable, recommendations for areal thermal loadings to assure retrievability of the canisters and long term safety of the repository are given. DOE

N79-27968# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. Fuer Extraterrestrische Physik.
MEASUREMENT OF THE SPECTRAL SENSITIVITY OF RADIATION DETECTORS AND DETECTOR SYSTEMS IN THE VACUUMULTRAVIOLET SPECTRAL RANGE BY USING A WALL STABILIZED Ar CASCADE ARC ACCORDING TO BOLDT AS A STANDARD RADIATOR [MESSUNG DER SPEKTRALEN EMPFINDLICHKEIT VON STRAHLUNGSEMPFAENGERN UND EMPFAENGERSYSTEMEN IM VAKUUMULTRAVIOLETT UNTER VERWENDUNG EINES WANDSTABILISIERTEN Ar-KASKADENBOGENS NACH BOLDT ALS STRAHLUNGSNORMAL]
K. Bischoff (Phys. Tech. Bundesanstalt), H. Kaase (Phys. Tech. Bundesanstalt), B. Nawo (Phys. Tech. Bundesanstalt), and K.-H. Stephan Apr. 1978 40 p refs In GERMAN; ENGLISH summary
(MPI-PAE/Extraterr-142) Avail: NTIS HC A03/MF A01

A VUV calibration facility is described. By means of this equipment the measurement of the sensitivity of radiation detectors in the spectral range from 90 to 250 nm is possible. The measuring method uses a wall stabilized Ar cascade arc as a standard radiator and by measuring the spectral transmittance of the optical arrangement, the monochromatic radiant flux, which reaches the detector or the detector system, can be given.
Author (ESA)

N79-27969# Rome Univ. (Italy). Ist. di Fisica G. Marconi.
HIGH ENERGY BEHAVIOR OF PION-NUCLEON-SCATTERING PARTIAL WAVES FROM AMPLITUDE ANALYSIS
E. Ferrari 16 Mar. 1978 27 p refs Prepared in cooperation with Ist. Nazl. di Fis. Nucl., Rome Submitted for publication
(Rept-78) Avail: NTIS HC A03/MF A01

The high energy behavior of the lowest partial waves in

pion-nucleon scattering was evaluated by use of a projection formula in which the data are taken from an amplitude analysis covering only a limited region of momentum transfer. The observed dominance of the amplitude C(+) allows for an approximate evaluation of the contribution from the region where data are not available. By using the results of the amplitude analysis by Hecht, Kroll and Jacob (extending up to an incident momentum of 14 GeV/c), it is found that at rather high energy (nearly > 5GeV) the I = 3/2 and I = 1/2 partial waves can be determined with an uncertainity nearly < 15-20%. Author (ESA)

N79-27970# Research Inst. of National Defence, Stockholm (Sweden).
PARTICULATE RADIOACTIVITY, MAINLY FROM NUCLEAR EXPLOSIONS, IN AIR AND PRECIPITATION IN SWEDEN, MID-YEAR 1975 TO MID-YEAR 1977
Lars-Erik DeGeer, Rune Arntsing, Ingemar Vintersved, Jan Sisefsky, Siv Jakobsson, and Jan-Aake Engstroem Nov. 1978 114 p refs
(FOA-C-40089-T2(A1)) Avail: NTIS HC A06/MF A01

The Swedish Network for radioactivity surveillance as well as preparation, measuring, and analysis procedures are described. Results on four-week samples of ground level air and deposition, on weekly samples of ground level air, and on high altitude samples collected during the two year period are discussed. The period covers three atmospheric nuclear tests performed by the Peoples Republic of China, a low-yield test on January 23, 1976, a medium-yield test on September 26, 1976, and a high-yield test on November 17, 1976. These three tests are discussed in terms of the atmospheric behavior of the debris cloud, fractionation and particle properties of the debris, and of neutron activation products detected. Results are used to construct a mass-yield curve which is compared with mass-yield curves for different monoenergetic neutrons incident on U238. Author (ESA)

N79-27971# Argonne National Lab., Ill. Applied Physics Div.
PHYSICS OF REACTOR SAFETY Quarterly Progress Report, Jul. - Sep. 1978
H. H. Hummel Nov. 1978 75 p refs
(DOE-40-550-75)
(PB-293662/3; ANL-78-106; NUREG-CR-0653) Avail: NTIS HC A04/MF A01 CSCL 18I

This quarterly progress report summarizes work done in Argonne National Laboratory's Applied Physics Division and Components Technology Division for the Division of Reactor Safety Research of the U.S. Nuclear Regulatory Commission during the months of July-September 1978. The work in the Applied Physics Division includes reports on reactor safety program by members of the Reactor Safety Appraisals Group, Monte Carlo analysis of safety-related (ZPR) Planning and Experiments Group. Work on reactor core thermal-hydraulic code development performed in the Components Technology Division is also included. GRA

74 OPTICS

Includes light phenomena.

N79-27972 Utah Univ., Salt Lake City.
LIGHT SCATTERING STUDIES OF MOLECULAR MOTION IN LIQUIDS Ph.D. Thesis
Scott Laird Whittenburg 1979 171 p
Avail: Univ. Microfilms Order No. 7915849

The Raman and depolarized Rayleigh spectra of acetonitrile pyridine, and carbon disulphide were studied as a function of temperature and concentration in an optically isotropic solvent, carbon tetrachloride. The lack of concentration dependence observed in the Raman and depolarized Rayleigh relaxation times showed that orientational pair correlation (OPC) was unimportant in acetonitrile and pyridine. However, the carbon disulphide was concentration dependent and therefore OPC was important. The reorientation of benzonitrile in a mixture of optically isotropic solvents, tert-butyl alcohol and carbon tetrachloride, were studied as a function of temperature and concentration. The solvent mixture has the same viscosity as neat benzonitrile. The depolarized Rayleigh and Raman reorientation times are found to agree and to be independent of concentration. Dissert. Abstr.

N79-27973 Arizona Univ., Tucson.
SUPPRESSION OF SCATTERED LIGHT Ph.D. Thesis
Robert Paul Breault 1979 131 p
Avail: Univ. Microfilms Order No. 7914438

The basic power transfer equation was written as the product of three factors: the surface scattering characteristics, a geometrical configuration factor, and the radiometric power on the source elements. Scattering measurements and their use in selecting suitable coatings were emphasized, and the effects of altering the baffle configurations were discussed. The development of a major stray radiation analysis program is described. It is a series of programs designed to apply the above concepts. This series optimizes manpower and computer time. Dissert. Abstr.

N79-27974 Toledo Univ., Ohio.
DEVELOPMENT OF OPTO-ELECTRONIC METHODS FOR THE INVESTIGATION OF THE OPTICAL AND MECHANICAL PARAMETERS OF TRANSPARENT MATERIALS Ph.D. Thesis
Stamatios Vasilios Kartalopoulos 1978 95 p
Avail: Univ. Microfilms Order No. 7914846

Opto-electronic methods for the evaluation of the optical and mechanical parameters of transparent materials, namely, the stress-optical coefficients and the ratio Poisson's ratio to Young's modulus with nontouching techniques for both static and dynamic conditions were developed. The basic philosphy of the method was based on simple interferometry connected with the variation of optical paths when optically transparent cracked and non-cracked plates are under stress. The shadow method or the method of caustics was one of the interferometric methods that were used to study the concentration of stress in the vicinity of the tip of a crack in optically transparent media. According to this method, a caustic, as it was observed on a screen, having an almost circular shape, was related to the size of the constrainted zone around the tip of the crack. Dissert. Abstr.

N79-27975*# Rockwell International Corp., Anaheim, Calif. Electronics Research Center.
ANALYSIS AND PRELIMINARY DESIGN OF OPTICAL SENSORS FOR PROPULSION CONTROL Final Report
K. A. James, W. H. Quick, and V. H. Strahan 23 Jan. 1979 90 p refs
(Contract NAS3-21005)
(NASA-CR-159519; C79-386/501) Avail: NTIS HC A05/MF A01 CSCL 20F

A fiber-optic sensor concept screening study was performed. Twenty sensor subsystems were identified and evaluated. Two concepts selected for further study were the Fabry-Perot fiber-optic temperature sensor and the pulse-width-modulated phosphorescent temperature sensor. Various designs suitable for a Fabry-Perot temperature sensor to be used as a remote fiber-optic transducer were investigated. As a result, a particular design was selected and constructed. Tests on this device show that spectral peaks are produced from visible white light, and the change in wavelength of the spectral peaks produced by a change in temperature is consistent with theory and is 36 nm/C for the first order peak. A literature search to determine a suitable phosphor for implementing the pulse-width-modulated fiber optic temperature sensor was conducted. This search indicated that such a device could be made to function for temperatures up to approximately 200 C. Materials like ZnCdS and ZnSe activated with copper will be particularly applicable to temperature sensing in the cryogenic to room temperature region. While this sensing concept is probably not applicable to jet engines, the simplicity and potential reliability make the concept highly desirable for other applications. A.R.H.

N79-27976*# Richmond Univ., Va. Dept. of Physics.
LASER MODULATION OF OPTICAL ABSORPTION IN ZnSe
R. Wayne Major 8 Oct. 1971 16 p refs
(Grant NGR-47-023-001)
(NASA-CR-158789) Avail: NTIS HC A02/MF A01 CSCL 20F

The possibility of producing and detecting laser induced modulation of absorption (LIMA) in ZnSe crystals using a moderate laser intensity of about 6 mw output was investigated. The modulation is smaller than that previously obtained with higher laser photon flux, but is not too difficult to detect. Modulation of the order of a few parts in 10 to the 5th power, up to one part in 10 to the 4th power appears typical at the present. LIMA pulse shapes were recorded with varying system resolutions at a half dozen wavelengths in the visible, from 4800 A to 6000 A. Detailed data were taken, particularly at 5000 A, for a range of time intervals following laser pulse turn-on. Quantitative study of the excitation and decay kinetics of these is underway, though analysis is not complete. Major features are discussed with attention centered upon the detailed measurements made most recently at 5000 A. A.R.H.

N79-27977# Naval Surface Weapons Center, White Oak, Md.
PHOTO-ELECTRO-OPTICAL REPRODUCTION TECHNOLOGY SURVEY
Norman D. Welch 1 Jul. 1978 78 p refs
(AD-A067534; NSWC/WOL/TR-78-91) Avail: NTIS HC A05/MF A01 CSCL 20/6

This report is an initial survey to determine the current status of Photo-Electro-Optical (PEO) reproduction technology. PEO includes topics such as image processing, electronic image acquisition, and reproduction. Included are several summaries describing PEO activity at various government and private installations, a summary of PEO technology and trends, a summary of PEO education sources, a bibliography of PEO-related literature, and a description of how PEO technology could be used to increase the effectiveness of NSWC's Photographic Branch.
Author (GRA)

N79-27978# Naval Ocean Systems Center, San Diego, Calif.
AIRCRAFT FIBER-OPTIC INTERCONNECT SYSTEMS PROJECT
T. A. Meador 1 Mar. 1979 47 p refs
(AD-A068366; NOSC/TR-390) Avail: NTIS HC A02/MF A01 CSCL 20/6

The Avioptics Program is an engineering and application development program whose central objective is to support the preparation of fiber-optic transmission technology for use in naval aircraft. The program has been organized and is being managed by the Air Surveillance Systems Project Office code 7309 of the Naval Ocean Systems Center (NOSC). The Avioptics Program Plan is presented in detail in NOSC Technical Document 197.1. The applications of principal interest in the Avioptics Program are the transmission interconnects of aircraft multiplex systems. Included within the scope of this area are digital time division multiplex TDM systems, video multiplex and distribution systems, and such equipment ensembles as armaments, flight control, and voice communications. GRA

N79-27979# Addis Translations International, Portola Valley, Calif.
STUDY OF A METHOD FOR FILTERING OPTICAL IMAGES
P. Croce 9 Sep. 1978 46 p refs Transl. into ENGLISH from Rev. Opt. (France), v. 35, no. 11, 1956 p 569-589 Sponsored by DOE Prepared for Battelle Pacific Northwest Labs., Richland, Wash.
(BNWL-TR-343) Avail: NTIS HC A03/MF A01

The theory of image formation by the method of Fourier analysis is reviewed briefly. Then a procedure is described with which an arbitrary linear transformation can be performed on the image when it is recorded photographically. Next, the conditions under which one must work to minimize distortion resulting from the recording are studied. Finally, experimental equipment, fabrication, and testing of frequency filters are discussed, along with results on improvement of the contrast and sharpness of photographic prints. DOE

N79-27980# Addis Translations International, Portola Valley, Calif.
STUDY OF A METHOD FOR FILTERING OPTICAL IMAGES
P. Croce 8 Sep. 1978 34 p refs Transl. into ENGLISH from Rev. Opt. (France), v. 35, no. 12, 1956 p 642-656 Sponsored by DOE Prepared for Battelle Pacific Northwest Labs., Richland, Wash.
(BNWL-TR-342) Avail: NTIS HC A03/MF A01

The filtering of spatial frequencies by double diffraction to improve the contrast of details in photographic images is discussed. Fabrication of a variable-opacity filter is described. Several experimental difficulties were encountered; however, the results indicate that the method permits efficient filtering when applied under good conditions. DOE

N79-27981# Technical Research Centre of Finland, Espoo. Semiconductor Lab.
OPTICAL PROPERTIES OF Si AND Ge SCHOTTKY BARRIER PHOTODECTECTORS AND LIGHT WAVEGUIDES. RESEARCH WITH REFERENCE TO OPTICAL FIBER COMMUNICATION Ph.D. Thesis - Helsinki Univ.
Matti Leppihalme 7 Jun. 1978 14 p refs
(VTT-ENT-23; ISBN-951-38-0639-1) Avail: NTIS HC A02/MF A01

Photoelectric measurements of different large area high resistivity Si and high purity Ge Schottky barrier photodetector were made at 300 K and at 100 K. The analysis of the photovoltage spectra gave, besides the barrier heights, the phonom energies associated with different indirect transitions. Mode-line analysis was applied to a variety of planar waveguides in integrated optics and a detailed description of refractive index profile calculations is given. Three-dimensional waveguides were also demonstrated. An active effect, electrooptical switching at the prism coupling point of the LiNbO3 waveguide, was observed and measured. The properties of grating structure constructed on the photoplate were discussed. The same kind of Si and Ge photodetectors as analyzed here separately were applied to the attenuation measurements of optical fibers. With the aid of the Ge detector the measurements could be extended up to about 1700 nm. The microstructure of the fibers was revealed by chemical etching and subsequently the fibers were studied by the scanning electron microscope and the optical microscope.
Author (ESA)

N79-27982# Laboratoire Central de Recherches Thomson-CSF, Orsay (France). Lab. Acoustique et Magnetisme.
MAGNETIC EFFECTS IN INTEGRATED OPTICS Final Report [EFFETS MAGNETIQUES EN OPTIQUE INTEGREE]
G. Hepner and J. P. Castera Apr. 1977 64 p refs In FRENCH Original contains color illustrations
(Contract DRME-75/34-278)
(LCR-494-292) Avail: NTIS HC A04/MF A01

Nonreciprocal transmission equipment based on integrated optics was built and studied in order to better define the interface between a magnetic field and optical signals. Results led to the construction and testing of rectangular magneto-optical waveguides. The conversion of the transversal electric mode to the transversal magnetic mode was investigated. As a medium of propagation a layer of YIG-Gd-Ga under low magnetizing was used. The use of a circulator as a laterally confined guide is discussed. An insulator was built made up of two mode converters and a transversal mode absorber obtained by the deposit of a metallic layer. Equipment test results are discussed in detail.
Author (ESA)

N79-27983# Laboratoire Central de Recherches Thomson-CSF, Orsay (France).
STUDY OF ELECTRICAL OPTICAL MATERIALS HAVING INCREASED PHOTOSENSITIVITY Final Report [ETUDE DES MATERIAUX ELECTROOPTIQUES A PHOTOSENSIBILITE ACCRUE]
Francois Micheron Jun. 1977 84 p refs In FRENCH; ENGLISH summary
(Contract DGRST-76-7-0782)
(LCR-77-32/R/G.5) Avail: NTIS HC A05/MF A01

Variations in the index of photoinduction in electro-optical materials, used for three-dimensional optical data storage were studied in order to show that they are related to the photoelectric state of the materials. The principle mechanisms responsible for this state are the photovoltaic effect and photoconductivity. Materials studied were BaTiO3, PLZT, LinbO3, Fe, Bi12SiO2, and Bi12GeO2O. Values measured to determine the limits of photosensitivity included the photoelectron/photon yield, the

electro-optical coefficient, and the dielectric constant. Results show that for certain materials photosensitivity can be increased by several orders of magnitude by augmenting energy (electric energy) exterior to the system. Author (ESA)

N79-27984# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
IMAGE QUALITY OF A WOLTER-1 TYPE X-RAY TELESCOPE UNDER PARTICULAR CONTRAST REDUCTION CONDITIONS DUE TO DIFFUSE REFLECTION [ABBILDUNGSEIGENSCHAFTEN EINES ROENTGENTELESKOPS VOM TYP WOLTER 1 UNTER RESONDERER BERUECKSICHTIGUNG DER KONTRASTVERMINDERUNG DURCH DIFFUSE REFLEXION]
Rainer Lenzen Sep. 1978 122 p refs In GERMAN
(MPI-PAE/Extraterr-145) Avail: NTIS HC A06/MF A01

The principles of this grazing incidence paraboloid-hyperboloid 32 cm mirror telescope intended for astrophysical measurements in the soft x-ray region are described. Dimensioning criteria, choice of materials for optical surfaces (in particular metals), and aberrations were studied. A good polished surface is necessary. Scattering variations with wavelength and glancing angle were investigated and compared with theoretical values. A computer simulation was used to determine the off-axis characteristics of the system and the best position for the detector. The correction of defects and the positioning of a transmission grating in a spectroscope system employing this telescope are described. Author (ESA)

N79-27985# Fondazione Ugo Bordoni, Rome (Italy).
MEASUREMENT OF OPTICAL FIBERS ATTENUATION BY THE REFLECTOMETRIC METHOD: EXPERIMENTAL APPARATUS AND ATTAINABLE ACCURACY [MISURA DELL'ATTENUAZIONE DI FIBRE OTTICHE CON IL METODO RIFFLETTOMETRICO: APPARATO SPERIMENTALE E PRECISIONE OTTENIBILE]
Franco Menaglia and Luigi Piccari Nov. 1977 10 p refs In ITALIAN
(FUB-16-1977) Avail: NTIS HC A02/MF A01

A reflectometric theory for measuring attenuation in optic fiber was developed along with an experimental apparatus. Advantages include the necessity of access to only one fiber terminal, that it is a nondestructive test, and that it gives information on either local or global characteristics. An example is given of the attenuation measurements on a quartz-plastic fiber, giving a loss of 83 bn/km. The experimental assembly is described and the theory defining the accuracy of the method is formulated. Author (ESA)

N79-27986# Fondazione Ugo Bordoni, Rome (Italy).
CHARACTERISTICS OF LOW LOSS OPTICAL FIBERS OBTAINED FROM COMMERCIALLY AVAILABLE DIELECTRICS [CARATTERISTICHE DI FIBRE OTTICHE A BASSE PERDITE OTTENUTE DA DIELETTRICI DISPONIBILI COMMERCIALMENTE]
Pier Francesco Checcacci (Ist. di Ric. sulle Onde Electromagnetiche del CNR, Florence), Anna Maria Scheggi (Ist. di Ric. sulle Onde Electromagnetiche del CNR, Florence), Benedetto Daino, and Carla Giacomo Someda (Univ. of Bologna) Dec. 1978 7 p refs In ITALIAN
(FUB-21-1977) Avail: NTIS HC A07/MF A01

Experimental quartz-plastic optical fibers were made and characterized using spectral attenuation measurements between 700 and 1000 nm, nondestructive measurements with a He-Ne laser, and impulse response analysis. Reflectometric methods were also used. Results show the feasibility of this type of fiber for short to medium distances (on the order of 1 km). Problems yet to be resolved include fiber aging and limited production length. Author (ESA)

N79-27987# Fondazione Ugo Bordoni, Rome (Italy).
MEASUREMENTS OF CHARACTERISTIC PARAMETERS OF AN OPTICAL FIBER
Andrea Tadeusiak (Politec. Univ., Warsaw) and Salvatore Piazzolla Dec. 1977 8 p
(FUB-22-1977) Avail: NTIS HC A02/MF A01

A set of measurements made on a 150m long sample of an optical fiber are described. The experimental fiber was produced at Warsaw University and the values of attenuation and dispersion were determined using a 125 spectra He-Ne mode-locked laser. The beam was split so that part was focused on the input face of the fiber and part was directed to photo diode whose output signal was used for triggering and as a reference signal for a 7704 Tektronic sampling oscilloscope. An HP 8554 L spectrum analyzer with a range from 1 KHz to 1.2 GHz was used to measure the beat amplitude between the longitudinal modes of the HE-NE laser. The separation is about 7.5 MHz. Dependence of the output amplitude and of half-height width of the detected pulse on the tilting angle are shown. The exit pulse at full acceptance angle has a half-height width of about 0.64 nsec, showing no difference with the pulse detected directly from the laser. The absolute value of the Fourier transform of the impulse response confirms that dispersion in the given sample is very low. Author (ESA)

N79-27988# Forschungsgruppe fuer Informationsverarbeitung und Mustererkennung, Karlsruhe (West Germany).
STUDY OF REAL-TIME CONVERTER OF AN INCOHERENT IMAGE INTO A TRANSPARENCY: OPTICAL TO OPTICAL CONVERTER/TECHNOLOGY STUDY
A. Kiessling Paris ESA Apr. 1978 160 p refs
(Contract ESTEC-2512/75-AK)
(ESA-CR(P)-1155) Avail: NTIS HC A08/MF A01

The structure of optical processors, the special structure of a simple optical correlation, and the requirements for the system-defining interface components were studied preliminary to the construction of an LC converter. The function of image converters on LC base is described. The principle of light modulation by LC-layers is demonstrated and compared to mathematic formulae. The technology of cell components is described. Theoretical remarks on optimization of the cell structure are made. Experimental results are presented, then used to analyze the prototype image converter device. Author (ESA)

N79-27989# European Space Technology Center, Noordwijk (Netherlands).
THE PROTOTYPE LOW-ENERGY TELESCOPE SYSTEM FOR THE INTERNATIONAL SOLAR COSPIN EXPERIMENT
R. G. Marsden and J. Henrion Jan. 1979 37 p refs
(ESA-STR-202) Avail: NTIS HC A03/MF A01

The design and prototype evaluation of the Low Energy Telescope (LET) is described. This charged particle detector system is included in the Cosmic Ray and Solar Charged Particle Investigations (COSPIN) as a collaborative experiment to be flown on the European spacecraft of the joint ESA/NASA International Solar Polar Mission. The principal features of the LET design are discussed, and the results of preliminary calibrations and response simulations are presented. Author (ESA)

N79-27990# National Bureau of Standards, Washington, D. C. Center for Materials Science.
OPTICAL MATERIALS CHARACTERIZATION Final Technical Report, 1 Feb. - 30 Sep. 1978
Albert Feldman, Deane Horowitz, Roy M. Waxter, and Marilyn J. Dodge Feb. 1979 74 p refs Sponsored in part by ARPA
(PB-292245/8; NBS-TN-993) Avail: NTIS HC A04/MF A01 CSCL 20F

Room temperature values of refractive index as a function of wavelength are presented for the following materials: commercially grown KCl, reactive atmosphere processed KCl, KCl nominally doped with 1.5% KI, hot forged CaF2, fusion cast CaF2, CaF2 doped with Er (0.001% to 3% Er), SrF2, chemical vapor deposited (CVD) ZnSe (2 specimens), and ZnS (CVD, 2 specimens). Data for the thermo-optic constant (dn/dT) and the linear thermal expansion coefficient are given for the following materials over the temperature range -180 C to 200 C:Al2O3, BaF2, CaF2, CdF2, KBr, KCl, LiF, MgF2, NaCl, NaF, SrF2, ZnS (CVD), and ZnSe(CVD). The piezo-optic constants of the following materials are presented: As2S3 glass, CaF2, BaF2, Ge, KCl, fused SiO2, SrF2, a chalcogenide glass (Ge 33%, As 12%, Se 55%) and ZnSe(CVD). GRA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N79-27991 California Univ., Los Angeles.
HIGH BETA PLASMAS IN TOROIDAL SURMACS Ph.D. Thesis
Robert William Schumacher 1979 261 p
Avail: Univ. Microfilms Order No. 7915679

The physics problems encountered in developing high order, toroidal multipole plasma confinement devices into fusion reactors are addressed. The high order configuration, termed Surmac for Surface Magnetic Confinement, is generated by internal current-carrying rings which produce closed, axisymmetric surface magnetic fields. Plasma is stabilized and confined by the deep magnetic well enclosed by the surface fields. An experimental approach was taken to address the three principal physics problems consisting of particle and energy transport scaling, MHD stability at finite beta equivalent to plasma pressure/magnetic pressure = 8 pi n (T sub e + T sub i)/B to the 2d power, and magnetic guarding of hoop supports. In order to extend the investigations into the higher temperature and beta collisionless regime a new device, the Dodecapole Surmac, was designed and constructed. Dissert. Abstr.

N79-27992 Illinois Univ. at Urbana-Champaign.
THE GROWTH OF DENSITY FLUCTUATIONS IN A FINITE SIZED INHOMOGENEOUS PLASMA Ph.D. Thesis
Robert Ross Peterson 1979 185 p
Avail: Univ. Microfilms Order No. 7915410

The details of the absorption of electromagnetic radiation in a plasma are important to the physics of laser-fusion. The growth of density fluctuations in an inhomogeneous plasma was studied because two mechanisms of absorption, anomalous absorption due to the growth of parametric instabilities and absorption by short wavelength density fluctuations, may be influenced by the growth of density fluctuations. An inhomogeneous bounded plasma is modeled to represent a laser-fusion plasma; part of the plasma, which was ablated from the main body of the plasma, is accounted for by adjustment of the boundary conditions on the density fluctuations. A system of hydrodynamic wave equations was developed to study the growth of density fluctuations in an inhomogeneous bounded plasma. A variational technique was developed to calculate the spatial eigenfunctions. Dissert. Abstr.

N79-27993 California Univ., Berkeley.
TEMPERATURE MEASUREMENTS IN THE TORMAC 4-C PLASMA Ph.D. Thesis
Martin Joseph Greenwald 1978 152 p
Avail: Univ. Microfilms Order No. 7914622

A magnetic confinement device TORMAC IV-c, was built to test the Tormac concept and the results of TORMAC IV-a. The new device had improved access for diagnostics, particularly for laser scattering and He-Ne interferometry. The results were disappointing; measured electron temperatures were consistently in the neighborhood of 5 eV. Peak densities were 5 to 8 x 10 to the 15th power/cu cm. Under these highly collisional conditions, no conclusions about Tormac confinement could be drawn. All results indicated a cold, fairly dense, highly collisional plasma. There were indications that the cusp fields produced a weak compression of the plasma. The compression was, apparently, neither strong enough nor rapid enough to produce any significant plasma heating. The most likely cause of the low temperature is cooling on the open cusp lines. The cusp fields seem to penetrate the plasma on a time scale shorter than the cusp risetime. Dissert. Abstr.

N79-27994 Johns Hopkins Univ., Baltimore, Md.
EXTREME ULTRAVIOLET DIAGNOSIS OF A NEUTRAL-BEAM-HEATED MIRROR MACHINE Ph.D. Thesis
Richard Paul Drake 1979 234 p
Avail: Univ. Microfilms Order No. 7914284

Extreme ultraviolet emissions from the 2X11B fusion research experiment were studied. 2X11B was a magnetic-mirror-plasma-confinement device; beams of high energy (20keV) neutral deuterium created a high density-grating, high temperature plasma. A normal-incidence concave-grating monochromator, equipped with a windowless photomultiplier tube, was used to measure emissions in the spectral region from 400 A to 1600 A. Emissions of oxygen, titanium, carbon, nitrogen, and deuterium were identified. A survey of the emission characteristics was performed. The effect of the electric field of the plasma on low energy impurities was studied by injecting neon into 2X11B. It is concluded that the electric field of the plasma did affect low energy impurities, either ejecting them or preventing their penetration. Dissert. Abstr.

N79-27995 California Univ., Berkeley.
DENSITY AND MAGNETIC FIELD MEASUREMENTS IN THE TORMAC IV-c PLASMA Ph.D. Thesis
John Walter Coonrod 1978 183 p
Avail: Univ. Microfilms Order No. 7914573

Tormac is a concept for magnetically confining a high-Beta fusion plasma in a toroidal, stuffed line cusp. A Tormac plasma has two regions: an interior confined on the closed toroidal field lines of the stuffing field, and an exterior sheath on open, cusped field lines. Tormac 4-c is an attempt to create and study a Tormac plasma with two cusp lines, a bi-cusp. It is a pulsed experiment; 10-50 mTorr of gas is preionized in a .5 meter diameter glass vessel in the presence of a 300 Gauss bias field. A 3-4 kG compression field then rises in 8.3 micro sec, sweeping up the plasma, and decays with tau = 80 micro sec. During that time, data are taken by Thompson scattering, laser interferometry, magnetic probes, and spectroscopy, and stored by an online computer. The design, construction and operation of Tormac 4-c are described and the results, with emphasis on describing the behavior of the density compression and field penetration, are reported. Dissert. Abstr.

N79-27996 Johns Hopkins Univ., Baltimore, Md.
AN EUV STUDY OF IMPURITIES IN THE ALCATOR A TOKAMAK Ph.D. Thesis
K. Chen 1979 117 p
Avail: Univ. Microfilms Order No. 7914279

A photometrically calibrated 0.4 m normal incidence EUV monochromator was used to study light impurities (O, N, C) and heavy impurities (Mo, Fe, Cr) in Alcator A. Besides temporal profiles of all the impurities, the spatial profiles of O VI, O V and N V were also obtained by tilting the monochromator to scan the plasma. The up-down asymmetry of the UV emissions from these impurity ions has been observed. The spatial scan yields a direct measurement of the ion density profile by taking the up-down asymmetry into account. The effects of wall temperature on light impurity concentrations were measured spectroscopically. The results show that a temperature reduction decreases the influx of oxygen by a factor of 4 to 5 in normal Tokamak operation when the wall temperature dropped from 450 K to 77 K but does not affect the other light impurities (N,C). Dissert. Abstr.

N79-27997# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MACROSCOPIC TRANSPORT EQUATIONS
J. A. Bittencourt Apr. 1979 42 p
(INPE-1471-RPE/022) Avail: NTIS HC A03/MF A01

The macroscopic transport equations, necessary for the description of plasmas as fluids are derived in a way which emphasizes their origin in the kinetic theory. The equations of conservation of mass, of momentum, and of energy, are obtained from a general transport equation, and are identified with the hierarchy of moments of the Boltzmann equation. The approximations inherent in the cold and warm plasma models are explicitly indicated. J.M.S.

N79-27998# Naval Research Lab., Washington, D. C.
X-RAY EMISSION FROM CH2 LASER-PRODUCED PLASMAS AT 10 TO THE 16TH POWER W/cm-2 Interim Report
D. G. Colombant and N. K. Winsor 28 Feb. 1979 33 p refs
(Contract ES-77-A-01-6021; NP Proj. 01-05-01)
(AD-A067517; AD-E000287; NRL-MR-3638) Avail: NTIS HC A03/MF A01 CSCL 20/9

X-ray spectra from CH2 laser-generated at 10 to the 16th

power W/sq cm are compared with those obtained using a 2D-mhd code. Good agreement is found over 7 orders of magnitude for X-ray energies comprised between 1 and 300 keV. It is found that the hard X-ray spectrum is compatible with the generation of B-fields in the interaction region. Variation of the numerical results with initial conditions, ion mass, laser energy deposition and grid size is investigated. Author (GRA)

N79-27999# Oak Ridge National Lab., Tenn.
ELMO BUMPY TORUS. ALTERNATE CONCEPTS DEVELOPMENT PROGRAM
Oct. 1978 51 p ref
(Contract W-7405-eng-26)
(CONF-7810127-1) Avail: NTIS HC A04/MF A01

In the five years since EBT-1 began operating, work progressed from demonstrating macrostability to an increasingly detailed understanding of transport properties. Collisionless scaling was observed and the magnitude of the energy confinement time is consistent with neoclassical theory. Experiments on EBT-2 are being conducted at the increased magnetic field levels and higher microwave power and frequency made possible by a 28 GHz gyrotron program. In conjunction with experimental advances, EBT theory now has a well developed transport theory which models the physics considered important: for example, it yields negative ambipolar electric fields which are consistent with those measured. Stability calculations continue to predict stable equilibrium with ring beta approximately core beta approximately 20 to 40 percent. The status of bumpy torus theory is discussed from the following points of view: equilibrium, stability, transport, heating, inequalities, and fueling. Scaling, reactor embodiment, and proof of principle for the EBT-2 are also explored. DOE

N79-28000# Argonne National Lab., Ill. Material Lab.
TWO-DIMENSIONAL MHD CHANNEL DESIGN
E. Doss, H. Geyer, Z. El-Derini, and R. K. Ahluwalia 1978 19 p refs Presented at the Symp. on Fluids Eng. Winter Ann. Meeting, San Francisco, 11-15 Dec. 1978
(Contract W-31-109-eng-38)
(CONF-781234-1) Avail: NTIS HC A02/MF A01

A two-dimensional MHD channel-design was developed for three different modes of operation: velocity, Mach number, and pressure. Given the distribution of any of these three parameters along the channel, the channel aspect ratio, and the channel operating conditions, the MHD channel geometry is predicted. For the same operating conditions, the results of these design modes are in excellent agreement with the results obtained with an original design, where the area is specified (area or off-design mode of operation). The developed design model avoids unnecessary assumptions for surface losses and boundary layer voltage drops and thus, can yield a better prediction of MHD channel geometry and performance in terms of the gasdynamic temperature, velocity, and pressure profiles, heat flux, sheer stress, and total power output. The subject model includes a simplified treatment for possible arcing near the electrode walls. DOE

N79-28001# Oak Ridge National Lab., Tenn.
BENDING FREE TOROIDAL SHELLS FOR TOKAMAK FUSION REACTORS WITH NONIDEAL MAGNETIC FIELD DISTRIBUTIONS
W. H. Gray 1978 13 p refs Presented at ASME Meeting, San Francisco, Calif., 10 Dec. 1978
(Contract W-7405-eng-26)
(CONF-781202-36) Avail: NTIS HC A02/MF A01

An extension of mathematical solutions to bending free shapes of toroidal pressure vessels is described. This family of shapes is derived by solving the equilibrium, constitutive, and kinematic relationships for a uniform toroidal shell using the linear membrane theory. The problem of finding bending free toroidal shell shapes for nonideal magnetic field distributions, i.e., for magnetic fields which do not vary inversely with toroidal radius is studied. Since these bending free shells provide alternative methods of design for Tokamak fusion reactors, serious consideration should be given to them. DOE

N79-28002# Los Alamos Scientific Lab., N. Mex.
CRYOGENIC LASER FUSION TARGET MATERIALS
J. R. Miller and W. J. Press 1979 19 p refs Presented at 1st Topical Meeting on Fusion Reactor Materials, Miami Beach, Fla., 29 Jan. 1979
(Contract W-7405-eng-36)
(LA-UR-79-101; Conf-790125-1) Avail: NTIS HC A02/MF A01

Laser fusion target designs exhibit improved performance when the fusion fuel, a deuterium--tritium (DT) mixture, is frozen into a uniform, solid shell. The formation of such a shell requires rapid isothermal cooling of the target to cryogenic temperatures. The cooling rate must be sufficiently fast to prevent significant, gravitationally driven downward flow of the DT as it passes from the gaseous through the liquid state. Because it is not possible to measure the uniformity of a solid DT layer in opaque, multishell targets, such targets were modeled to calculate the cooling rate and the expected thickness uniformity of the DT shell. The presented results provide target designers with practical guidelines for the selection of materials and configurations, which will assist in the fabrication of high-quality cryogenic targets. DOE

N79-28003# Grumman Aerospace Corp., Bethpage, N.Y.
DESIGN IMPROVEMENTS SIMPLIFY REMOTE MAINTENANCE OF TOKAMAKS
P. T. Spampinato, C. Sardella, and T. E. Shannon 1978 16 p refs Presented at ANS Meeting, Washington, D. C., 12 Nov. 1978
(Contract W-7405-eng-26)
(CONF-781105-86) Avail: NTIS HC A02/MF A01

The modifications to the Oak Ridge baseline TNS which led to significant improvements in device maintainability are discussed. They are: (1) a reduction in the number of toroidal field coils used and an increase in coil size, (2) a rearrangement of poloidal field coils to preclude the need for coil dismantling during a torus sector replacement; and (3) the use of a secondary vacuum enclosure. Various types of secondary enclosures are discussed, and the rationale for selecting a vacuum building approach is given. DOE

N79-28004# Chalmers Univ. of Technology, Goteborg (Sweden). Inst. for Electromagnetic Theory.
SPACE AND TIME SOLUTION FOR TWO COUPLED INTENSITY DEVIATIONS FROM A STATIONARY NONLINEAR STATE Research and Training Programme on Controlled Thermonuclear Fusion and Plasma Physics (EUR-NE)
H. Wilhelmsson, A. Bondeson, and M. Lisak 1977 27 p refs Avail: NTIS HC A03/MF A01

Some properties of a generalized form of the so called Volterra equations in two independent variables, time and one space coordinate, are studied. It is shown that this system of equations can be used to describe the interaction of two waves propagating in a nonlinear medium, e.g. a plasma, by means of a coupling to a strongly damped mode. It is also shown that under certain circumstances a stationary solution of the Volterra type equations exists. The evolution in time and on space coordinate of small intensity deviations from the stationary state is also examined. Author (ESA)

N79-28005# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
EXPERIMENTAL AND THEORETICAL STUDIES OF INTEGRAL EXCITATION CROSS SECTIONS ASSOCIATED WITH ALKALI-RARE GAS COLLISIONS Thesis - Goettingen Univ., West Ger. [EXPERIMENTELLE UND THEORETISCHE UNTERSUCHUNG INTEGRALER ANREGUNGSQUERSCHNITTE BEI ALKALI EDELGAS STOESSEN]
Peter Andresen Feb. 1978 175 p refs In GERMAN
(MPIS-3/1978) Avail: NTIS HC A08/MF A01 Max-Planck Inst. fuer Stroemungsforsch., Goettingen, West Ger. DM 28,05

The state of an alkali ion beam in collision with rare gas molecules was studied in order to develop and explain experimental and theoretical results concerning the collision mechanism of electrically excited atoms. Resonance transfer during collision and excitation decay were measured using emitted light and an interference filter. By observing collision induced scattering the dominance of resonance excitation was quantitatively verified spectroscopically. The vacuum ultraviolet fluorescent emission was also measured. Energy transfer is analyzed numerically in terms of Coulomb potential and the Hartree-Fock wave function.

Experimental results show a good fit with the theoretical model of the collision mechanism. Author (ESA)

N79-28006# Fom-Instituut voor Plasmafysica, Jutphaas (Netherlands).
PROPOSAL FOR A MODIFICATION OF SPICA
C. Bobeldijk, J. P. Freidberg (Los Alamos Sci. Lab., Calif.), J. P. Goedbloed, A. C. Griffioen, E. J. M. vanHeesch, P. Hellingman, J. A. Hoekzema, D. A. Dippolito (Univ. of Calif., Los Angeles), W. Kooijman, P. Manintveld et al Oct. 1978 196 p refs Sponsored jointly by Ned. Organisatie voor Zuiver-Wetenschappelijk Onderzoek (ZWO) and EURATOM
(Rept-78-112) Avail: NTIS HC A09/MF A01

Results and conclusions of recent experimental and theoretical screw-pinch research at Jutphaas are discussed. Based on these conclusions a modification of the toroidal vacuum chamber and the conducting shell of SPICA is proposed. The physics objectives of the modified experiment (SPICA II) as well as the planning are described. Detailed information on experimental results and on specific aspects of the problem such as the stabilization of high-beta toroidal plasmas, forces on the vacuum vessel, copper shell and coils, derivation of design parameters of SPICA II, etc., is given in the appendices. Author (ESA)

N79-28007# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
LANGMUIR TURBULENCE AND DISSIPATION OF HIGH FREQUENCY ENERGY
A. A. Galeev, R. Z. Sagdeev, V. D. Shapiro, and V. I. Shevchenko 1977 72 p refs
(PR-353) Avail: NTIS HC A04/MF A01

Cavity collapse, as the key mechanism in short wave pumping of Langmuir waves, is presented as the basis for the theory of strong Langmuir turbulence in an isotropic plasma. The linear theory of modulation instability is discussed leading to the accumulation of Langmuir waves into clusters of high-frequency energy with the plasma expelled from them, i.e. caverns. The model solutions, describing the collapse of caverns with plasmons, are given. The theory of quasi-stationary turbulence is developed where the energy transported as Langmuir waves from an external source is repumped in the collapsing caverns to shorter scales and finally, is absorbed due to landau damping. The self consistent spectra of waves and particles in such turbulence are obtained, the effective frequency of collisions characterizes the rate of absorption of energy from the source in Langmuir turbulence. Author (ESA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N79-28008 Illinois Univ. at Urbana-Champaign.
MECHANISTIC STUDIES IN THE ORGANIC SOLID STATE Ph.D. Thesis
Reginald Alvis Booker 1979 276 p
Avail: Univ. Microfilms Order No. 7915323

The photochemical rearrangements in the solid state and gas-solid reactions of two C-nitro aromatic aldehydes was investigated. The solid state elimination of water from crystalline phloroglucinol dihydrate is discussed. The dihydrate crystallizes in the orthorhombic crystallographic system with four molecules of phloroglucinol and eight molecules of water per unit cell. Dissert. Abstr.

N79-28009 North Carolina Univ. at Chapel Hill.
A MICROSCOPIC, SUBMICROSCOPIC, AND MICROSEISMIC ANALYSIS OF STABLE CRACK PROPAGATION AND THE EFFECT OF CHEMICAL ENVIRONMENT ON STABLE CRACK PROPAGATION IN SYNTHETIC QUARTZ Ph.D. Thesis
Jeremy David Dunning 1978 81 p
Avail: Univ. Microfilms Order No. 7914343

Cracks were mapped by phase contrast and transmission electron microscopy, from open crack throats to atomically sharp crack tips. Each crack is composed of straight segments in the basal plane (0001), and zigzag segments composed of r (1011) and z (0111) cleavage steps. Crack geometry appears to be constant regardless of chemical environment. No submicroscopic evidence was found of dislocation nucleation or mobility influencing crack growth. The data appear to be consistent with a surface free energy model based on the availability of adsorbable ions. Microseismic monitoring of the dry samples confirm that acoustic emissions occur only during crack propagation, and that the nature of crack propagation can be determined by the amplitude of the acoustic emissions. Dissert. Abstr.

N79-28010 California Univ., Berkeley.
ENERGY TRANSFER IN ANISOTROPIC SYSTEMS. A: EXCITON MIGRATION IN SUBSTITUTIONALLY DISORDERED ONE-DIMENSIONAL SOLIDS. B: THE SPECTROSCOPY OF MOLECULES ADSORBED ON METAL SURFACES Ph.D. Thesis
Dirk Adrian Zwemer 1978 230 p
Avail: Univ. Microfilms Order No. 7914832

The energy and dynamics of excited states in a variety of anisotropic environments, including isotopically and chemically mixed crystals and molecular overlayers adsorbed on a nickel (111) surface, were investigated using laser excitation phosphorescence spectroscopy, optically-detected magnetic resonance, and spectroscopic ellipsometry. The relationship between local and long-range structure and spectroscopic properties is explored. Experimental results for triplet energy partitioning between mobile and stationary trap states as a function of mobile trap concentration in the ternary d2-1,2,4,5-tetrachlorobenzene-h2-1,2,4,5-tetrachlorobenzene-pyrazine system are analyzed with regard to the proposed models for one-dimensional energy transfer in substitutionally disordered solids. The UV spectra of pyrazine, pyridine, and naphthalene adsorbed on a nickel single crystal (111) surface are discussed. Dissert. Abstr.

N79-28011 Iowa State Univ. of Science and Technology, Ames.
KINETIC MODELS FOR IRREVERSIBLE PROCESSES ON A LATTICE Ph.D. Thesis
Nicholas Owen Wolf 1979 221 p
Avail: Univ. Microfilms Order No. 7916218

The development and application of kinetic lattice models are considered. For the most part, the discussions are restricted to lattices in one-dimension. A brief overview of kinetic lattice model formalisms and an extensive literature survey are presented. A review of the kinetic models for noncooperative lattice events is presented. The development of cooperative lattice models and solutions of the resulting kinetic equations for an infinite and a semi-infinite lattice are discussed. The cooperative models are then applied to the problem of theoretically determining the sticking coefficient for molecular chemisorption. Other possible applications of the model and several model generalizations are considered. An experimental study toward elucidating the mechanistic factors influencing the chemisorption of methane on single crystal tungsten is reported. Dissert. Abstr.

N79-28012 California Univ., Berkeley.
CATALYSIS BY PLATINUM SINGLE CRYSTAL SURFACES: LOW PRESSURE HYDROCARBON REACTIONS AND THE EFFECTS OF INTRODUCING STRONGLY BOUND OXYGEN AT THE SURFACE Ph.D. Thesis
Carol Ellen Smith 1978 184 p
Avail: Univ. Microfilms Order No. 7914766

The ,dehydrogenation of cyclohexene and cyclohexane, and the hydrogenation of cyclohexene were studied on the clean and preoxidized surfaces of three platnium single crystals. The choice of reaction conditions is discussed with respect to detection limits and the variation of the catalyst reactivity with reagent pressures and catalyst temperature; the reactions were carried out using flow conditions at low pressure, at a platinum temperature of 150 C. Low coverages of strongly bound oxygen enhanced the rates of the dehydrogenation and hydrogenation reactions, and changed the selectivity of cyclohexene dehydrogenation to benzene over hydrogenation to cyclohexane. These effects of preoxidation on catalytic rates and selectivity were found to be sensitive to the structure of the platinum surface. Three models are discussed which relate the oxidation of platinum surfaces to

the observed effects on catalytic reactivity and the structure sensitivity. Dissert. Abstr.

N79-28013 Wisconsin Univ. - Milwaukee.
DISSOLUTION PROCESSES OF ALUMINUM OXIDE ON TUNGSTEN, IRIDIUM, MOLYBDENUM, TANTALUM, AND RHENIUM AS A FUNCTION OF ELECTRIC FIELD STRENGTH Ph.D. Thesis
Larry Robert Pederson 1978 239 p
Avail: Univ. Microfilms Order No. 7916106

From measurements in a field electron microscope, the activation energies for desorption of face-specific and nonface-specific aluminum oxide layers from tungsten, iridium, molybdenum, tantalum, and rhenium were calculated as a function of electric field strength. The activation energies for desorption of face-specific layers at zero applied field from Ir (100), W (110) are 98 + or - 10, 74 + or - 7, and 110 + or - 20 kcal/mole, respectively. Activation energies for desorption of non-face-specific layers from areas near W < 111 >, Mo < 111 >, Ta < 111 >, and Re (1120) are 37 + or - 4, 23 + or - 2, 27 + or - 3, and 52 + or - 5 kcal/mole, respectively.
Dissert. Abstr.

N79-28014 Boston Univ., Mass.
MOSSBAUER STUDY OF Y(Fe(0.022)Co(0.978)2) FROM 295K TO 0.18K USING A STOCHASTIC MODEL OF MAGNETIC ORDERING Ph.D. Thesis
Michael Richard Corson 1979 140 p
Avail: Univ. Microfilms Order No. 7912135

Mossbauer effect measurements on a polycrystalline absorber having x=0.022 show a single quadrupole-split doublet from 295K down to 8K. Continuing down in temperature, the spectrum broadens and, between 3K and 2K, the spectrum is quite broad and unresolved. Below 2K, a Zeeman plus quadrupole pattern begins to emerge, but with significant broadening. A stochastic model of magnetic ordering in which the effective magnetic field flips randomly up and down along the easy axis of magnetization, and does not include any effects due to inhomogeneous fields was found to fit experimental spectra over the entire temperature range. The magnetic ordering parameters, which describe the magnetic ordering of the iron atoms of two subspectra, show temperature dependences characteristic of magnetization curves having Curie temperatures for the two sites of 3.2 + or - .2K (0 deg) and 4.3 + or - 1K (70 deg). Dissert. Abstr.

N79-28015 North Carolina Univ. at Chapel Hill.
A STUDY OF IMPURITY AND RADIATION INDUCED POINT DEFECTS IN MgAl2O4 (SPINEL) Ph.D. Thesis
Grady Spruce White 1978 114 p
Avail: Univ. Microfilms Order No. 7914422

Optical absorption, thermoluminescence, thermally stimulated conductivity, and thermoelectric power experiments were used to study point defects in as received, gamma, electron, and neutron irradiated, and additively and subtractively colored spinel. Electron irradiation, neutron irradiation, and coloration all produced an optical absorption band at 5.3 eV which was tentatively attributed to the F center. Annealing experiments indicate that the oxygen vacancies in the colored samples become mobile above 900 C and recombine at dislocations which are distributed uniformly throughout the crystal instead of diffusing to the crystal surface. F centers were produced in the colored samples by heating in the presence of either aluminum or magnesium metal or by heating near the spinel melting temperature in a reducing atmosphere. Dissert. Abstr.

N79-28016 Illinois Univ. at Urbana-Champaign.
CRITICAL BEHAVIOR OF THE n-VECTOR AND CHARGED n-VECTOR MODELS FROM AN EXACT SOLUTION TO THE SCREENING APPROXIMATION Ph.D. Thesis
Mark Patrick Sears 1979 84 p
Avail: Univ. Microfilms Order No. 7915421

The n-vector model is solved exactly within the screening approximation. Results for the high temperature phase are presented. For large n there is the expected agreement with the 1/n expansion results while for small n the nonexistence of a solution in the regime of spatial dimension 2 less than or equal to d less than or equal to 4 is explored. By keeping the dual leading corrections to the scaling Green's function the correct connection between the Green's function and specific heat is established and the cancellation of infrared divergences is demonstrated. The charged n-vector model, which consists of the ordinary n-vector model with a coupling to an abelian gauge field, is appropriate for the scaling regions of the superconducting phase transition and smectic A-nematic transitions in some liquid crystals. The calculation presented is exact to leading order in 1/n for all d and results are given for d = 2 + epsilon, 2 3 and r - epsilon. Dissert. Abstr.

N79-28017 Illinois Univ. at Urbana-Champaign.
THE SCATTERING OF THERMAL PHONONS BY EXTENDED DEFECTS IN DIELECTRIC CRYSTALS Ph.D. Thesis
Emanuel Peter Roth 1979 191 p
Avail: Univ. Microfilms Order No. 7915418

The scattering of thermal phonons by extended defects in dielectric crystals was observed through measurements of thermal conductivity and ballistic heat pulse propagation. The thermal conductivities of LiF and NaCl containing 500 low-angle grain boundaries per cm were measured in the range 0.08-5 K. Measurements of phonon scattering at 10 deg grain boundary in silicon using direct generation and detection of ballistically propagating heat pulses were made. The LiF crystals were deformed either by shearing or bending then measured in freshly deformed condition and after a series of irradiations with 0.66 MeV gamma rays. The measurements of the sheared crystal indicated that the slow transverse phonon mode was strongly scattered by a dynamic phonon-dislocation interaction, while the remaining modes were scattered primarily by the boundaries.
Dissert. Abstr.

N79-28018 Oregon Univ., Eugene.
SOME OBSERVABLE PROPERTIES OF CRYSTALLINE ELECTRONS IN MAGNETIC FIELDS: EXACT RESULTS IN MODEL CRYSTALS Ph.D. Thesis
Ranjan Ray 1978 126 p
Avail: Univ. Microfilms Order No. 7907496

The problem of an electron in the simultaneous presence of a periodic crystalline electric field and a uniform magnetic field is examined. The ratio of the crystalline period and the cyclotron period, called phi, turns out to be of paramount importance in the problem. A formulation of the problem as an energy matrix diagonalization yields a certain difference equation for the eigenvalues when applied to a model crystal potential. An exact density of states for an electron whose eigenenergies obey this equation is derived for all rational phi's. It was found that the integrated density of states shows a continuous deformability through all rational phi's. The density of states is applied to compute the thermodynamic potential of an ensemble of noninteracting electrons with Hofstadter's spectrum. Direct magneto-optical absorption between a narrow valence band and a tight-binding conduction band is examined. Dissert. Abstr.

N79-28019 Illinois Univ. at Urbana-Champaign.
A LOW TEMPERATURE ULTRASONIC STUDY OF HYDROGEN IN NIOBIUM Ph.D. Thesis
David Brian Poker 1979 158 p
Avail: Univ. Microfilms Order No. 7915413

Measurements were made of the velocity and attenuation of ultrasonic waves in niobium containing 1000 ppm oxygen with additional concentrations of hydrogen, to determine the properties of a relaxation of the hydrogen which appears below 10 K. Measurements were made as a function of temperature, frequency, polarization of the ultrasonic wave, hydrogen isotope, and concentration of hydrogen and oxygen. Dissert. Abstr.

N79-28020 Johns Hopkins Univ., Baltimore, Md.
DEPTH PROFILING OF THE MAGNETIC HYPERFINE FIELD IN ULTRA-THIN FILMS OF IRON Ph.D. Thesis
Alexander Hamilton Owens 1979 127 p
Avail: Univ. Microfilms Order No. 7914298

The variation of the magnetic hyperfine field within a 60 A iron film was investigated by creating a family of iron films, each of which contains approximately 50 A of Fe-56 and 10 A of Fe-57. The 10 A probe layer of Fe-57 was placed at various positions within the film. Once the films were constructed, Moessbauer effect experiments were made on the films and a hyperfine magnetic field profile was obtained. These measurements

were made at 4.2 K and 295 K. It is concluded that increases in the magnetic hyperfine field observed by earlier workers are associated with the surface of the film. Furthermore, several mechanisms are proposed to account for the observed changes.
Dissert. Abstr.

N79-28021 California Univ., San Diego.
PHYSICAL PROCESSES IN POSITRON SCATTERING AT METAL SURFACES Ph.D. Thesis
Joseph Oliva 1979 187 p
Avail: Univ. Microfilms Order No. 7915641

Results of a theoretical study of low energy positron diffraction (LEPD) from metal surfaces are presented. The use of LEPD as a complement of LEED is suggested. Elastic scattering is analyzed for jellium, jellium plus single core layer, and jellium plus periodic core lattice models for the substrate. The role of the electrostatic dipole barrier is particularly brought out and a possible experimental technique for the direct determination of the quantity via LEPD is proposed. Positron-conduction electron inelastic scattering was also calculated. Plasmon and particle-hole pair excitation are considered and useful results for the mean free path of a positron moving in an electron gas are presented. The theory of the recently observed high efficiency of positronium formation at metal surfaces (pick-up) occuring when a medium energy positron beam is made incident upon a metal is investigated.
Dissert. Abstr.

N79-28022 Rochester Univ., N. Y.
THEORY OF HOLE TRANSPORT IN RARE GAS SOLIDS Ph.D. Thesis
Vinita Johri Ghosh 1978 163 p
Avail: Univ. Microfilms Order No. 7914466

Holstein's small polaron theory (in the non-adiabatic approximation) was modified to explain the temperature dependence of the hole mobilities in the rare gas solids, Ne, Ar, Kr, and Xe. The holes are assumed to be localized through the formation of an R2(+) molecular ion. The electron photon coupling is taken to be linear as well as quadratic. This gives rise to a localized defect phonon mode in addition to the acoustic phonons. An equation of motion for the hole polarons is derived assuming that the electrons interact with all these phonon modes. The hole mobility was calculated for two different cases: when the electron-phonon coupling is only with acoustic phonons but that the electronic transfer matrix element J depends on the nuclear displacements; and when the electrons also interact with the localized defect phonon mode but J is a constant (Condon approximation). An expression for the mobility is obtained making both changes simultaneously.
Dissert. Abstr.

N79-28023 Yale Univ., New Haven, Conn.
INTERFACE AND ELECTRON TUNNELING PROPERTIES OF THIN OXIDES ON SILICON Ph.D. Thesis
Paul Vincent Dressendorfer 1978 318 p
Avail: Univ. Microfilms Order No. 7916610

Tunneling in metal tunnel oxide semiconductor (MTOS) devices was investigated by assessing the effects of process variations on tunnel-oxide quality. Fixed-charge and interface-state densities as well as tunneling properties were determined for MTOS junctions with various processing conditions. Tunnel oxides were produced with one to two orders of magnitude lower fixed-charge and interface-state densities than previously reported, and which exhibit freedom from defect dominated currents. A model appropriate to the MTOS system is developed which takes into account oxide nonuniformities and both qualitatively and quantitatively matches experimental characteristics without arbitrary scaling parameters. The evidence from the processing study, the internal photoemission experiments, and the study of tunneling currents indicate that tunnel oxide films on silicon can be produced which have properties very similar to those of thick silicon dioxide layers. Thus the interfacial region between silicon and thermally grown silicon dioxide can be very thin, and probably is less than 6 A.
Dissert. Abstr.

N79-28024*# Alabama A & M Univ., Normal.
A STUDY OF CRYSTAL GROWTH BY SOLUTION TECHNIQUE Final Technical Report, Mar. 1977 - Nov. 1978
R. B. Lal Jul. 1979 50 p refs
(Grant NsG-8033)
(NASA-CR-158763; AAMU-NAS-004) Avail: NTIS HC A04/MF A01 CSCL 20B

The advantages and mechanisms of crystal growth from solution are discussed as well as the effects of impurity adsorption on the kinetics of crystal growth. Uncertainities regarding crystal growth in a low gravity environment are examined. Single crystals of triglycine sulfate were grown using a low temperature solution technique. Small components were assembled and fabricated for future space flights. A space processing experiment proposal accepted by NASA for the Spacelab-3 mission is included.
A.R.H.

N79-28025*# Virginia State Univ., Petersburg.
MATERIAL SCIENCE AND SOLID STATE PHYSICS STUDIES WITH POSITIVE MUON SPIN PRECESSION Progress Report
Carey E. Stronach 15 Jun. 1979 48 p refs
(Grant NsG-1342)
(NASA-CR-158786) Avail: NTIS HC A03/MF A01 CSCL 20L

The hyperfine field on the muon, B sub hf, at interstitial sites in dilute Fe(Al) alloys was measured for four different concentrations of Al and as a function of temperature by the muon spin rotation method. The magnitude of B sub hf, which is negative, decreases at rates ranging from 0.09 + or - 0.03% per at.% Al at 200 K to an asymptotic limit of 0.35 + or - far above 440 K. This behavior shows that sites near the Al impurity are weakly repulsive to the muon, with an interaction potential of 13 + or - 3 meV. In order to fit the temperature dependence of the hyperfine field, it is necessary to hypothesize the existence of a small concentration of unidentified defects, possibly dislocations, which are attractive to the muon. Although the Al impurity acts as a non-magnetic hole in the Fe lattice, the observed decrease in B sub hf is only 35% of the decrease in the bulk magnetization. It is concluded that B sub hf is determined mainly by the enhanced screening of conduction electrons in Fe and Fe(Al). Since the influence of the Al impurity on the neighboring Fe monents is very small, most of the change in B sub hf is therefore attributed to the increase in conduction electron polarization of the Al impurity.
Author

N79-28026# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ON THE USE OF THE PHOTOACOUSTIC EFFECT FOR INVESTIGATING PHASE-TRANSITIONS IN SOLIDS
M. A. A. Siqueira, C. C. Ghizoni, J. I. Vargas, E. A. Menezes, H. Vargas, and L. C. M. Miranda May 1979 18 p refs Submitted for publication
(INPE-1476-RPE/027) Avail: NTIS HC A02/MF A01

The usefulness of the photoacoustic effect for investigating phase transitions in solids is experimentally demonstrated by exploring the dependence of the photoacoustic signal on the thermal properties of the sample. Aluminum doped V02 is used as an example. The photoacoustic cell utilized in the experiments is described. Germanium single crystals are used to characterize the cell.
J.M.S.

N79-28027# National Bureau of Standards, Washington, D. C. National Engineering Lab.
DEVELOPMENT OF HYDROGEN AND HYDROXYL CONTAMINATION IN THIN SILICON DIOXIDE THERMAL FILMS Final Report
Santos Mayo and William H. Evans Mar. 1979 39 p refs
(AD-A067963; NBSIR-78-1558) Avail: NTIS HC A03/MF A01 CSCL 20/12

Hydrogen and hydroxyl incorporation into thin silicon dioxide films thermally grown on silicon in dry oxygen atmospheres contained in resistance-heated fused silica or polycrystalline silicon tubes is analyzed. The mechanisms leading to incorporation of these impurities in the film are discussed in terms of trace water and hydrocarbon contamination in the oxygen used, room ambient humidity permeation through the fused silica tube, the silicon wafer preparation prior to oxidation, and other environment factors. The most significant reactions occurring the water-silica-silicon system during wafer oxidation at temperatures in the range from 800 C to 1200 C are discussed. It is shown that, during the oxidation period required to grow a 100-nm thick silicon dioxide film on a (100) silicon wafer in nominally dry oxygen

containing water contamination in the ppm range, the introduction of hydrogen and hydroxyl contamination into the oxide film can be explained in terms of the water-silica interaction. The use of polycrystalline silicon oxidation tubes is discussed with reference to the inherent water gettering action of silicon at oxidation temperatures. Author (GRA)

N79-28028# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Ballistics Research Lab.

SEARCH FOR LOW-LYING TRIPLET ELECTRONIC STATES

Richard A. Beyer Feb. 1979 24 p refs

(AD-A068465; AD-E430212; ARBRL-MR-02902) Avail: NTIS HC A02/MF A01 CSCL 20/10

Using lifetime measurements and qualitative quantum yield measurements, it has been shown that there are no triplet electronic states below 2.9 eV (67 kcal/mole or 0.46 aJ) for either isopropyl nitrate or n-propyl nitrate. These results suggest that spin-orbit coupling to bound triplet states is probably not important in the thermal decomposition of nitrate esters. GRA

N79-28029# Iowa State Univ. of Science and Technology, Ames. Dept. of Physics.

HYDROGEN DIFFUSION AND ELECTRONIC STRUCTURE PARAMETERS IN TANTALUM HYDRIDES DETERMINED BY PULSED NMR MEASUREMENTS

P. A. Hornung, A. D. Khan, D. R. Torgeson, and R. G. Barnes 1979 11 p refs Presented at the Hydrogen in Metals Intern. Meeting, Munster, West Germany, 6 Mar. 1979

(Contract W-7405-eng-82)

(IS-M-178; Conf-790301-2) Avail: NTIS HC A02/MF A01

The proton spin-lattice relaxation time in the tantalum-hydrogen system was measured over the temperature and composition ranges, 77 K < or = T < or = 470 K and 0.155 < or = H/Ta < or = 0.677, respectively. In the high temperature, solid-solution alpha phase, the activation energy for hydrogen diffusion determined from the dipolar contribution to T shows a weakly increasing trend from 0.134 eV/atom at H/Ta = 0.155 to 0.140 eV/atom at H/Ta = 0.677. Boundaries between ordered hydride phases and the phase, located by the occurrence of abrupt changes in T agree very well with other recent determinations. The quanity (T/sub 1e/T)/sub 1/2/, based on the conduction electron contribution., (T/sub 1e)/-1 to the relaxation rate (T)/-1, is proportional to the density of states at the Fermi level N(E/sub F/). (T/sub 1e/T)/sup -1/2/ decreases linearly with increasing hydrogen concentration, similarly to its behavior in the V-H and Nb-H systems. DOE

N79-28030# California Univ., Berkeley. Lawrence Berkeley Lab.

HYDROGEN IN GERMANIUM

E. E. Haller Sep. 1978 18 p refs Presented at the 10th Intern. Conf. on Defects and Radiation Effects in Semicond., Nice, 11-14 Sep. 1978

(Contract W-7405-eng-48)

(LBL-7996; Conf-780954-2) Avail: NTIS HC A02/MF A01

Hydrogen is shown to form molecular acceptors and donors in pure germanium. Piezospectroscopy reveals that the hydrogen-related shallow donor D has non-tetrahedral symmetry. One hydrogen atom is incorporated in D as shown with an isotope shift in the donor ground state. Oxygen is also involved in the formation of D. The hole emission rates of two copper-hydrogen acceptor complexes were determined with Deep Level Transient Spectroscopy. They are: e sub1/sup Cu-H/ = 1.5 x 10 to the 8th power sq T exp (-.195eV/kT) K /2/s and e sub 3/sup Cu-H/ = 5.0 x 10 to the 8th power sq T exp (-.068/T) K/2/s. DOE

N79-28031# Laboratoire Central de Recherches Thomson-CSF, Orsay (France).

THE USE OF MOLECULAR SPRAYS IN ULTRAHIGH VACUUM FOR GaAs MONOCRYSTALLINE GROWTH APPLICATIONS Final Report [UTILISATION DE JETS MOLECULAIRES EN ULTRAVIDE POUR L'APPLICATION A LA CROISSANCE MONOCRISTALLINE DE GaAs, VOLUME 1]

J. Massies, P. Etienne, G. Bichon, J. Chaplart, F. Dezaly, A. Doriath, and N. T. Linh Sep. 1976 39 p refs In FRENCH 2 Vol.

(Contract DRME-75/34-329)

(LCR-2251-DK-PT-1) Avail: NTIS HC A03/MF A01

A technique for growing GaAs single crystal layers on a semiconducting substrate was improved under laboratory conditions. A molecular spray is used in an ultrahigh vacuum for depositing epitaxial layers. This makes possible the control of the flux rate by mass spectrometry while using solid arsenic as a source product. Mobility and photoluminescence were improved over previous results. Epitaxial layers were obtained, doping with tin, being doped at the rate of 5 x 10 to the 16th power to 5 x 10 to the 17th power/cu cm and having a mobility of 3000 to 3600 sq cm (1/V) (1/S). Author (ESA)

N79-28032# Laboratoire Central de Recherches Thomson-CSF, Orsay (France).

IN DEPTH STUDY OF THE MAGNETOCRYSTALLINE ANISOTROPY OF POLYCRYSTALLINE FERRIMAGNETIC OXIDES Final Report [ETUDE APPROFONDIE DE L'ANISOTROPIE MAGNETOCRISTALLINE DANS LES OXYDES FERRIMAGNETIQUES POLYCRISTALLINS]

William Simonet Jun. 1977 101 p refs In FRENCH

(Contract DGRST-75-7-1478)

(LCR-1437/77) Avail: NTIS HC A06/MF A01

The different methods used for measuring the magnetocrystalline anisotropy of polycrystals were evaluated in order to identify that method which is the best adapted for ease of application and precision. The recent synthesis of ferrite and garnet polycrystals has made it possible to obtain a wider variety of compositions than with single crystals. The technique chosen in function of these crystals measures in the X band the line width of gyroresonance delta H as a function of temperature. The anisotropy of yttrium-iron garnets, after substituting Ca In V and Ca Zr, was measured. The limitations of the method are given and a supplementary procedure is suggested which would make possible a better separation of the parameters affecting delta H. Author (ESA)

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

N79-28033 California Univ., Berkeley.

THERMODYNAMIC ANALYSIS OF EQUILIBRIUM PHASE RELATIONS AMONG MINERALS AND AQUEOUS SOLUTIONS IN METASOMATIC PROCESSES Ph.D. Thesis

John Victor Walter 1978 143 p

Avail: Univ. Microfilms Order No. 7914804

The thermodynamic properties of aqueous silica and the solubility of quartz and its polymorphs at high pressures and temperatures were investigated. The success of theoretical equations developed in reproducing the experimental solubilities of alpha quartz at both low and high pressures and temperatures reinforce other evidence indicating a polar charge distribution in the solvated SiO2 molecule. Methods for predicting the geologic consequences of the thermodynamic behavior of aqueous silica are discussed. Metasomatic phase relations in the system CaO-MgO-SiO2-HCl-CO-H2O at high pressures and temperatures are described and interpreted. Comparative calculations indicate that nonideal mixing in the system CO2-H2O has a dramatic effect on the equilibrium activities and total concentrations of ionic species in fluids coexisting with calc-silicate mineral assemblages. Dissert. Abstr.

N79-28034 Rochester Univ., N. Y.

NONLINEAR MODELS IN HAMILTONIAN DYNAMICS AND STATISTICAL MECHANICS Ph.D. Thesis

Anastassios Christos Bountis 1978 168 p

Avail: Univ. Microfilms Order No. 7914461

The periodic solutions, analytic in t and with arbitrary period

of the Henon-Heiles dynamical system were constructed by a rapidly convergent variational method. The method of Hill's determinants for the differential equations of Hamiltonian systems was extended to the difference equations of dynamical mappings on the plane, and on analytic stability criterion for periodic orbits (finite set of points). Exactly, and in closed form, the classical partition function was also derived for two types of 1-D N-body systems: one is a 'chain' of equal charges in a uniform field interacting via 'nearest neighbor' Coulomb forces, and the other is a 1-D 'fluid' with exponential pair interactions between any two particles. Dissert. Abstr.

N79-28035 Yale Univ., New Haven, Conn.
INTERACTIONS OF HEAVY QUARKS IN QUANTUM CHROMODYNAMICS Ph.D. Thesis
Michael Dine 1978 121 p
Avail: Univ. Microfilms Order No. 7916609

The problem of extracting instantaneous interaction potentials from quantum field theory is reviewed, in the context of simple models. After reviewing the quantization of nonAbelian gauge theories in Coulomb gauge, the interaction of a heavy quark-antiquark pair is considered. The spin-dependent interactions in these systems are analyzed. The spin-dependent potentials depend in a nontrivial way on the quark mass. This dependence arises from processes taking place at distances on the order of the quark Compton wavelength. The phenomenological implications of these results are considered. The implications of the results for nonperturbative attacks on the potential problem are discussed. The importance of source-field correlations is stressed. Self-consistency criteria are given which any computation of an instantaneous potential must satisfy. The limitations of schemes which have been introduced recently to compute spin-dependent forces due to instantons are illustrated. Dissert. Abstr.

N79-28036 California Univ., Berkeley.
MOLECULAR THERMODYNAMICS OF VAPOR-LIQUID AND LIQUID-LIQUID EQUILIBRIA Ph.D. Thesis
Thomas Frank Anderson 1978 602 p
Avail: Univ. Microfilms Order No. 7914530

Using the maximum-likelihood method, UNIQUAC binary parameters were determined for 150 binary systems obtained from experimental vapor-liquid equilibrium data. A systematic method is described for incorporating limited ternary tie-line data into parameter estimation, using the maximum-likelihood method. The technique outlined is readily generalized to multicomponent (greater than three components) mixtures. The calculation of engineering equilibrium properties at high pressure, using a partition function is described. It is shown that for wide-boiling mixtures, the bubble-point curve (pressure vs. temperature at constant composition) may exhibit a minimum, in agreement with experiment for helium-containing natural-gas mixtures. Dissert. Abstr.

N79-28037# Department of Energy, Bartlesville, Okla. Energy Technology Center.
ENTHALPY OF COMBUSTION OF RJ-6
N. K. Smith Apr. 1979 10 p refs
(Grant AF-AFOSR-0009-78)
(AD-A067968; AFOSR-79-0508TR) Avail: NTIS HC A02/MF A01 CSCL 21/4

In cooperation with the Air Force Office of Scientific Research, this laboratory has studied compounds that may be used to impart particular properties to fuels such as high enthalpy of combustion per unit volume or per unit mass. This report concerns the ramjet fuel RJ-6. Author (GRA)

N79-28038# Wisconsin Univ. - Madison. Mathematics Research Center.
A NONLINEAR HYPERBOLIC VOLTERRA EQUATION ARISING IN HEAT FLOW
John A. Nohel Jan. 1979 22 p refs
(Contract DAAG29-75-C-0024; Grant DAAG29-77-G-0004)
(AD-A068898; MCR-TSR-1906) Avail: NTIS HC A02/MF A01 CSCL 20/13

A mathematical model for nonlinear heat flow in a rigid body of material with memory leads to the integrodifferential equation problem which is analyzed by an energy method developed jointly with C. M. Dafermos. Global existence, uniqueness, boundedness and the decay of smooth solutions as t approaches infinity are established for sufficiently smooth and small data, under physically reasonable assumptions. GRA

N79-28039# Fermi National Accelerator Lab., Batavia, Ill.
QUANTUM MECHANICS AND QUARKONIUM: AN INTRODUCTORY REVIEW
C. Quigg Oct. 1978 40 p refs Presented at the Meeting on Frontier of Physics, Singapore, Japan, 14 Aug. 1978
(Contract EY-76-C-02-3000)
(FERMILAB-CONF-78/82-THY; Conf-780876-5) Avail: NTIS HC A03/MF A01

The spectra of the psi and upsilon families of heavy mesons are interpreted in the framework of nonrelativistic potential models. Recent data on the upsilons are summarized, and their impact is assessed. DOE

N79-28040# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
A TABLE OF MISCELLANEOUS THERMODYNAMIC PROPERTIES FOR VARIOUS SUBSTANCES WITH EMPHASIS ON THE CRITICAL PROPERTIES
Dirk Rathmann, Juergen Bauer, and Philip A. Thompson Jun. 1978 81 p refs
(MPIS-6/1978) Avail: NTIS HC A05/MF A01; Max-Planck Inst. fuer Stroemungsforsch., Goettingen, West Ger. DM 14,55

Properties cited include: molecular weight, triple temperature in Kelvin, normal boiling point in Kelvin, critical temperature in Kelvin, triple pressure in bars, Critical pressure in bars, critical specific volume in cm/g, Z sub C = p sub c v sub c/RT sub c. The following factors are calculated from values cited in the table. Pitzer acentric factor, value of the Riedel parameter alpha, vapor pressure average absolute percent error, reduced ideal gas heat capacity, reduced liquid heat capacity, liquid density, dipole moment in debyes, and reduced dipole moment. Author (ESA)

N79-28041# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
ON THE EXISTANCE OF PHYSICAL SPACES WITH A DIMENSIONALITY OF N NOT EQUALS 3 + 1
I. L. Rozental 1978 25 p refs
(PR-400) Avail: NTIS HC A02/MF A01

The universality of basic physical principles is considered, discussing physical phenomena in N-dimensional spaces. Universal constants and the existance of the observer, the existence of many physical spaces, the universality of the 3-D space, the infinities and the dimensionality N and the transition from (N-1) to N dimensions are the main subjects of this analysis. Author (ESA)

N79-28042# National Engineering Lab., East Kilbride (Scotland). Special Projects Group.
THERMODYNAMIC METHODS FOR DETERMINING LOSSES IN HYDRAULIC COMPONENTS: A SURVEY
A. Kjoelle Aug. 1978 33 p refs
(NEL-657) Avail: NTIS HC A03/MF A01

Fundamentals of the thermodynamic measurements for determining energy losses in hydraulic systems are briefly described. Some measuring principles applicable to oil hydraulic pumps and motors for efficiency determination are considered. With available devices efficiency can be determined to + or - 1% when temperatures are known within + or - 0.01 K and the pressure differential is greater than 50 bar. The main problem improving the accuracy of thermodynamic test results is to create a more exact knowledge of the physical and thermodynamic properties of oils. Author (ESA)

N79-28043# National Engineering Lab., East Kilbride (Scotland). Special Projects Group.
RELATIONSHIP OF PVT CONDITIONS AND SPECIFIC HEAT CAPACITY OF OILS FOR THERMODYNAMIC MEASUREMENTS
A. Kjoelle Sep. 1978 65 p refs
(NEL-658) Avail: NTIS HC A04/MF A01

The relative density function of an oil chosen as a reference from 24 oils is found to describe the pressure/temperature dependence of the density of the individual oils to within + or 0.5%. A smaller sample of oils indicates a similar function for

the temperature dependence of the specific heat. The relative specific volume and a coefficient for evaluating the cubic expansion energy of isentropic processes are calculated for the reference oil. Inaccuracies from the application of these quantities to the other oils are included in considering total errors of thermodynamic measurements in pumps and motors. Determination of efficiency is possible to within + or - 1% when temperatures are known to within + or - 0.01 K and the pressure difference is greater than 50 bar. Author (ESA)

N79-28044# Research Inst. of National Defence, Stockholm (Sweden).
THERMONUCLEAR REACTION RATES IN A DEUTERIUM-TRITIUM PLASMA
Lars Beckman Dec. 1978 26 p refs
(FOA-C-20283-A2) Avail: NTIS HC A03/MF A01

In a deuterium-tritium plasma six thermonuclear reactions take place between the deuterons, tritons, and the 3He-particles formed in about half of the d-d-reactions. The rate constants for these six reactions were calculated from evaluations of the reaction cross sections taken from the literature. In some cases, notably the reactions t+t, t+3He and 3He+3He, the number of published cross section measurements is small and the uncertainty in the calculated rate constants consequently large. Analytical expressions for the rate constants as functions of plasma temperature are given. Author (ESA)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N79-28045*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE EFFECTS OF CONTEXT ON MULTIDIMENSIONAL SPATIAL COGNITIVE MODELS Ph.D. Thesis - Arizona Univ.
Edwin G. Dupnick May 1979 229 p refs
(NASA-TM-58219; JSC-14902) Avail: NTIS HC A11/MF A01 CSCL 05A

Spatial cognitive models obtained by multidimensional scaling represent cognitive structure by defining alternatives as points in a coordinate space based on relevant dimensions such that interstimulus dissimilarities perceived by the individual correspond to distances between the respective alternatives. The dependence of spatial models on the context of the judgments required of the individual was investigated. Context, which is defined as a perceptual interpretation and cognitive understanding of a judgment situation, was analyzed and classified with respect to five characteristics: physical environment, social environment, task definition, individual perspective, and temporal setting. Four experiments designed to produce changes in the characteristics of context and to test the effects of these changes upon individual cognitive spaces are described with focus on experiment design, objectives, statistical analysis, results, and conclusions. The hypothesis is advanced that an individual can be characterized as having a master cognitive space for a set of alternatives. When the context changes, the individual appears to change the dimension weights to give a new spatial configuration. Factor analysis was used in the interpretation and labeling of cognitive space dimensions. A.R.H.

N79-28046# Texas Univ. at Austin. Center for Cybernetic Studies.
A BI-EXTREMAL PRINCIPLE FOR ESTIMATING EFFICIENCY FRONTIER PARAMETER VALUES
A. Charnes, W. W. Cooper, and A. P. Schinnar Mar. 1979 16 p refs
(Contracts N00014-75-C-0616; N00014-75-C-0569; N00014-76-C-0932; Grant NSF SOC-76-15876)
(AD-A068992; CCS-329) Avail: NTIS HC A02/MF A01 CSCL 12/2

A new approach is supplied for evaluating the efficiency of decision making units, locating efficiency frontiers and estimating parameters from observational data. This is accomplished by means of a nonlinear-nonconvex bi-extremal principle which is subsequently shown to be essentially reducible to a finite sequence of linear programming problems. The development is illustrated by means of multiple output functions which are piecewise of Cobb-Douglas or general log linear type and which also allow for increasing, decreasing and constant returns to scale. The reduction of the bi-extremal principle to linear programming equivalence is also accomplished for much more general classes of functions. GRA

N79-28047# Naval Postgraduate School, Monterey, Calif.
FEASIBILITY STUDY OF A COMPUTERIZED MANAGEMENT INFORMATION SYSTEM FOR THE NOAA CORPS PERSONNEL SYSTEM M.S. Thesis
Alan D. Anderson Dec. 1978 153 p refs
(AD-A068578) Avail: NTIS HC A08/MF A01 CSCL 05/1

The National Oceanic and Atmospheric Administration (NOAA) Commissioned Personnel Division was in the situation of being subject to increasing demands for information and services and having a fixed number of office personnel to fulfill those demands. A study was performed to investigate the feasibility of converting some aspects of the manual data handling procedures to computerized handling. Objectives were defined as: reducing data retrieval and information preparation time; increasing currency of data; aiding in monitoring suspense dates; eliminating some hard copy records; and improving information dissemination. A generalized computer system using a data base management system software package was designed. Alternatives for obtaining the requisite capabilities were evaluated and an implementation procedure was outlined. It was concluded that the automation of the system was feasible and would most likely result in increased effectiveness. GRA

N79-28048# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
DECISION MAKING AND PROBLEM SOLVING WITH COMPUTER ASSISTANCE [ENTSCHEIDEN UND PROBLEMLOESEN MIT RECHNERUNTERSTUETZUNG]
K.-F. Kraiss Feb. 1978 73 p refs In GERMAN; ENGLISH summary
(FB-36) Avail: NTIS HC A04/MF A01; Forschungs Inst. fuer Anthropotech., Meckenheim, West Ger. DM 10

In modern guidance and control systems the human as manager, supervisor, decision maker, problem solver, and trouble shooter often has to cope with a marginal mental workload. To improve this situation, computers should be used to relieve the operator of mental stress. This should be done not solely through increased automation, but through a reasonable sharing of tasks in a human computer team, whereby the computer supports the human intelligence. Recent developments in this area are summarized. It is shown that interactive support between operator and computer is feasible during information evaluation, decision making, and problem solving. The applied artificial intelligence algorithms comprehend pattern recognition and classifications, and machine learning as well as dynamic and heuristic programming. Elementary examples are presented to explain basic principles. Consequences for the layout of future man-machine systems, resulting from cooperation between human and artifical intelligence are discussed. Author (ESA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N79-28049# Committee on Government Operations (U. S. House).

FEDERAL INFORMATION CENTERS ACT

Washington GPO 1978 15 p refs Rept. to accompany H.R. 13688 for Comm. on Government Operations, 95th Congr., 2d Sess., 25 Aug. 1978

(H-Rept-95-1530; GPO-32-923) Avail: US Capitol, House Document Room

The amendment of the bill presented contains two changes in the text. The first change consisted in the removal of the initial capital letters from the word Information Centers, and the second added a reference to the new section 112 of title 1 in the table of contents of the Federal Property and Administrative Services Act of 1949. H. R. 13688 with amendments, was approved on August 15, 1978. M.M.M.

N79-28050# Pittsburgh Univ., Pa. Learning Research and Development Center.

PLANNING NETS: A REPRESENTATION FOR FORMALIZING ANALOGIES AND SEMANTIC MODELS OF PROCEDURAL SKILLS

Kurt VanLehn and John Seely Brown Dec. 1978 62 p refs (Contracts N00014-78-C-0022; MDA903-76-C-0108; RR0420602)

(AD-A067907; TR-1) Avail: NTIS HC A04/MF A01 CSCL 09/4

At some time in our lives, we have all been forced to learn the procedural skills which supposedly comprise mathematical literacy (e.g., place value addition) through the process of rote memorization, perhaps, enhanced by the use of models (e.g., the abacus). These models were intended to provide an intuitive basis for a given procedure. This formalizes the concept of an analogy between procedures based on a Sacerdoti-like representation called planning nets. A planning net represents the synthesis of a given procedure from a set of constraints that define the properties of the arithmetic operation being implemented and the representation of the objects (numbers) being manipulated. An analogy between procedures is represented as a maximal partial isomorphism between the planing nets of the two procedures. The planning net representation turns out to provide an elegant framework for defining the teleologic semantics of a procedure as well as for investigating how to construct a natural sequence of models (or microworlds) for a student to use in inventing his own procedure. Since both utilize the same framework, we have an extraordinarily powerful way to explain (or teach) the underlying teleology by showing how to relate it to a sequence of intuitively understood models. GRA

N79-28051# Harris Corp., Melbourne, Fla. Electronic Systems Div.

HUMAN READ - MACHINE READ MICROFILM MASS MEMORY SYSTEM Final Technical Report, Apr. 1974 - Jul. 1978

T. H. Otten and R. H. Nelson Griffiss AFB, N. Y. RADC Mar. 1979 189 p

(Contract F30602-74-C-0152)

(AD-A068892; RADC-TR-79-30) Avail: NTIS HC A09/MF A01 CSCL 14/5

The Human Readable/Machine Readable (HRMR) Microfilm Mass Memory System is an information storage and retrieval system for machine readable digital data and human readable microimages. The system is designed to record, via laser, both human readable microimages and machine readable binary data on nominal 105mm by 148mm film chips. Each film chip provides the storage capacity for up to 98 human readable microimages or thirty million binary bits. The system provides on-line automated storage and retrieval of film chips. This is achieved by the storage and retrieval unit which provides the capacity to store 6,750 film chips (containing a total of 2 times 10 to the 11th power bits of binary data). Under computer control, it is designed to provide rapid, random access to these film chips and on-line readout of the machine readable data recorded on any chip. GRA

N79-28052# Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).

SBIBLI: A DATA BASE SYSTEM FOR BIBLIOGRAPHIC REFERENCES

Lutz Schubert Mar. 1978 65 p refs In GERMAN; ENGLISH summary

(FFM-264) Avail: NTIS HC A04/MF A01

A program system is presented to aid the prospective user in creating, updating, and above all, using his individual file of bibliographic references. The system is thought to bridge the gap between the personal card catalog and the huge, powerful, and not always attainable documentation system. It is highly user-oriented. The user is not assumed to be intimately familiar with bibliographies or information retrieval. The functions of the system are described in some detail and its structure and design sketched. How to use the system is thoroughly explained and examples are given. Author (ESA)

N79-28053# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computing.

SFS: A FILE SYSTEM SUPPORTING PASCAL FILES. DESIGN AND SPECIFICATION

A. R. Lawrence and D. Schofield Feb. 1978 27 p refs

(NPL-DNACS-88) Avail: NTIS HC A03/MF A01

A structured file system (SFS) which is compatible with Pascal but which is also powerful enough for wider use is described. For example, an enquiry package can be written which will work for any file. SFS allows both sequential and direct access. Records may be retrieved on the basis of information in the various fields and indexes may be constructed if required. The SFS can provide an environment in which both Pascal and application-independent utilities can be used. The SFS is being implemented as part of the distributed processing facilities on the NPL network. Author (ESA)

N79-28054# Research Inst. of National Defence, Stockholm (Sweden).

PERFORMANCE EVALUATION OF A PROTOTYPE RELATIONAL DATA BASE HANDLER FOR TECHNICAL AND SCIENTIFIC DATA PROCESSING

Per Svensson Dec. 1978 53 p refs

(FOA-C-20281-D8) Avail: NTIS HC A04/MF A01

The concept of constructing a general support system for technical and scientific data processing, based on modern theories and methods for data storage and retrieval, was studied. The design, programming, and performance evaluation of a prototype high-performance data handler for a relational data base system has been completed. The results of the performance evaluation, which was carried out as a comparison with a commercially available data base system are presented. Author (ESA)

N79-28055# Fondazione Ugo Bordoni, Rome (Italy).

ANALYSIS OF COSTS AND BENEFITS IN AUTOMATED INFORMATION SYSTEMS [L'ANALISI DEI COSTI E DEI BENEFICI NEI SISTEMI DI INFORMAZIONE AUTOMATIZZATI]

Manfredo Gervasi Oct. 1977 7 p refs In ITALIAN Presented at Ann. Congr. of the Assoc. Ital. per il Calcolo Autom., Pisa, Italy 12-14 Oct. 1977

(FUB-45-1977) Avail: NTIS HC A02/MF A01

The cost and characteristics of the main information retrieval systems (DIAOG, SDC, ESA-ESRIN, etc) are described. The advantages derived from the use of these systems are listed. The european community project 'EURONET' is discussed and diminution of costs is foreseen. Author (ESA)

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N79-28056# Solar Energy Research Inst., Golden, Colo.

REVIEW OF SELECTED SOLAR MARKET STUDIES AND

TECHNIQUES Progress Report
Don Berliner, S. Christmas, D. Costello, and C. Fellhauer Oct. 1978 58 p refs
(Contract EG-77-G-01-4042)
(SERI/PR-52-076) Avail: NTIS HC A04/MF A01

The preliminary results of a literature review of solar energy market studies in the industrial process heat, passive, solar thermal electric, photovoltaic, wind, and ocean thermal technologies are presented. Useful elements of market studies in other solar areas are described as well. The market research literature is reviewed in order to investigate techniques or approaches that may have some applicability in the context of solar markets. A preliminary plan is presented for the initiation of selected solar market studies during FY79. DOE

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N79-28057# Committee on Appropriations (U. S. Senate).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, INDEPENDENT AGENCIES APPROPRIATION BILL, 1980
Washington GPO 1979 107 p refs Rept. to accompany H.R. 4394 for Comm. on Appropriations, 96th Congr., 1st Sess., 24 Jul. 1979
(S-Rept-96-258) Avail: US Capitol, Senate Document Room

Appropriations for the Department of Housing and Urban Development, and for sundry independent agencies, boards, commisions, corporations, and offices for the fiscal year ending September 30, 1980, and for other purposes were reported. The Nasa Budget estimate was approved while making some additions and reductions. This enables NASA to start some programs which were turned down by the Office of Management and Budget for inclusion in this year's request. M.M.M.

N79-28058# Department of Energy, Washington, D. C. Office of Regulations and Emergency Planning.
FINDINGS AND VIEWS CONCERNING THE EXEMPTION OF KEROJET FUELS FROM THE MANDATORY PETROLEUM ALLOCATION AND PRICE REGULATIONS
Dec. 1978 105 p refs
(DOE/ERA-0023) Avail: NTIS HC A06/MF A01

Based on an analysis of historic and projected supply, demand, and price trends, the DOE concluded that allocation and price controls are no longer necessary for kerojet fuel and that exemption of kerojet fuel will be consistent with the attainment, to the maximum extent practicable, of the objectives specified. DOE

N79-28059# Department of Energy, Washington, D. C. Energy Information Administration.
MIDTERM OIL AND GAS SUPPLY MODELING SYSTEM METHODOLOGY DESCRIPTION
C. Everett, N. Mahn, and K. Jones Nov. 1978 51 p
(DOE/EIA-0103/17; TM/ES/79-05) Avail: NTIS HC A04/MF A01

The Midterm Oil and Gas Supply Modeling System is a computer based model which projects domestic oil and natural gas production for 15 years based on economic and engineering factors which effect oil and gas supply. The regional oil and gas supply curves developed are input to the Project Independence Evaluation System. The Oil Supply Model consist primarily of three interconnected submodels: a drilling submodel; a resource submodel; and an economic submodel. Also included in the Modeling System is a financial model which tabulates detailed costs and revenue information calculated from the minimum acceptable price model into regional income statements and selected balance sheet items for the oil and gas producing industry. DOE

N79-28060# Oesterreichische Akademie der Wissenschaften, Vienna.
SPACE ACTIVITY IN AUSTRIA, 1976/77
Ferdinand Steinhauser 1977 22 p refs Presented at 20th COSPAR Plenary Meeting and Assoc. Activities, Tel Aviv, 7-18 Jun. 1977
Avail: NTIS HC A02/MF A01

The program of the Austrian Solar and Space Agency (ASSA) covers, in addition to the coordination of national activities in the field of space research and applications, the coordination of Austrian activities in the field of solar energy research. ASSA reports on their participation in the programs of the European Space Agency (ESA), in particular that of spacelab. ASSA's participation in other programs for international cooperation in scientific research is also reported. Author (ESA)

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N79-28061 Syracuse Univ., N. Y.
AN ENVIRONMENTAL ASSESSMENT OF SEWERAGE CENTRALIZATION WITH SPECIAL REFERENCE TO NEW YORK STATE Ph.D. Thesis
Douglas Edwin Heath 1978 392 p
Avail: Univ. Microfilms Order No. 7914221

Sewerage centralization, the prevalent practice of planning and constructing more extensive sewer networks and fewer but larger treatment plants is documented and evaluated. County plans developed under the New York Comprehensive Sewerage Studies Program are analyzed to document recommended centralization. Seven indicators are identified and mapped, and two indexes are computed and mapped. Recommended centralization is massive in metropolitan counties and modest in rural counties. Analysis of subcounty planning units within metropolitan regions suggests that when such regions lie largely within one county, their plans tend to recommend a greater degree and more uniform pattern of sewerage centralization. The research develops a case for less sewerage centralization. Dissert. Abstr.

N79-28062*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
NASA JSC WATER MONITOR SYSTEM: CITY OF HOUSTON FIELD DEMONSTRATION
R. E. Taylor, E. L. Jeffers, and D. H. Fricks Jul. 1979 57 p refs
(NASA-RP-1041; S-490; JSC-14832) Avail: NTIS HC A04/MF A01 CSCL 13B

A water quality monitoring system with on-line and real time operation similar to the function in a spacecraft was investigated. A system with the capability to determine conformance to future high effluent quality standards and to increase the potential for reclamation and reuse of water was designed. Although all system capabilities were not verified in the initial field trial, fully automated operation over a sustained period with only routine manual adjustments was accomplished. Two major points were demonstrated: (1) the water monitor system has great potential in water monitoring and/or process control applications; and (2) the water monitor system represents a vast improvement over conventional (grab sample) water monitoring techniques. S.E.S.

N79-28063# Argonne National Lab., Ill. Energy and Environmental Systems Div.
COMPUTER SOFTWARE FOR PLANNING DESIGN OF COMMUNITY ENERGY SYSTEMS
Veronika A. Rable, James M. Calm, and John J. Roberts 1978 7 p refs Presented at the Joint Natl. Meeting of the Operations Res. Soc. of Am. and the Inst. of Management Sci., Los Angeles, 13-15 Nov. 1978
(Contract W-31-109-eng-38)
(CONF-781182-2) Avail: NTIS HC A02/MF A01

Simulation and optimization procedures for community energy

systems are presented. Community systems are recognized as offering energy conserving alternative methods of meeting the energy service needs of communities. The integrated Community Energy Systems (ICES) approach is discussed. The need for sophisticated analytical methods for ICES planning and design is explored. A software series developed or under development to meet these needs is presented. G.Y.

N79-28064# Elrick and Lavidge, Inc., San Francisco, Calif.
COMMERCIALIZATION FOCUS GROUP INTERVIEW: ELECTRIC/HYBRID VEHICLES Summary Report
Aug. 1978 19 p
(Contract EV-78-C-01-6457)
(DOE/TIC-10008) Avail: NTIS HC A02/MF A01

A group of experts met on July 31, 1978 to discuss the potential for the commercialization of electric/hybrid vehicles. Most group members feel that technology is available today to produce electric vehicles suitable for some personal and commercial uses. However, commercialization on a scale that would have a significant impact on petroleum usage will require government incentives, research and development, and time for the research to produce results for the necessary sales, promotion, and service support to be developed. Chances of successful near-term commercialization are considered to be greater in the commercial than the personal market. An aggressive, leading role by the Federal government will significantly speed up successful commercialization. DOE

88 SPACE SCIENCES (GENERAL)

N79-28065*# Iowa Univ., Iowa City.
RESEARCH IN SPACE PHYSICS AT THE UNIVERSITY OF IOWA Annual Report, 1978
J. A. VanAllen Jul. 1979 41 p refs
(Grant NGL-16-001-002)
(NASA-CR-158782) Avail: NTIS HC A03/MF A01 CSCL 03B

Current investigations relating to energetic particles and the electric, magnetic, and electromagnetic fields associated with the earth, the sun, the moon, the planets, comets, and the interplanetary medium are reported. Primary emphasis is on observational work using a wide diversity of intruments on satellites of the earth and the moon and on planetary and interplanetary spacecraft, and on phenomenological analysis and interpretation. Secondary emphasis is given to closely related observational work by ground based radio-astronomical and optical techniques, and to theoretical problems in plasma physics as relevant to solar, planetary, and interplanetary phenomena. A.R.H.

N79-28066*# National Aeronautics and Space Administration, Washington, D. C.
REPORTS OF PLANETARY GEOLOGY PROGRAM, 1978 - 1979
Joseph Boyce, comp. and Patricia S. Collins, comp. Jun. 1979 477 p refs
(NASA-TM-80339) Avail: NTIS HC A21/MF A01 CSCL 03B

Work conducted by the Planetary Geology Program is summarized. Significant accomplishments with each areas are reported. S.E.S.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N79-28067 Maryland Univ., College Park.
TOPICS IN ASTROPHYSICAL X-RAY AND GAMMA RAY SPECTROSCOPY Ph.D. Thesis
Roger Wade Bussard 1978 129 p
Avail: Univ. Microfilms Order No. 7915784

A number of topics relating to astrophysical observations that were made or are currently planned of spectral features, mostly emission lines, in the X-ray and gamma ray regions of the electromagnetic spectrum are investigated. These topics include: the production of characteristic X-ray and gamma ray lines by nonthermal ions, spectral features induced by processes occuring in strong magnetic fields, and the positron annihilation line at 0.5 MeV. Although physical spectroscopy in this regime is quite young, a number of conclusions can be drawn from existing observations and upper limits, and much can be learned from experiments currently under consideration. Dissert. Abstr.

N79-28068 Columbia Univ., New York.
A STUDY OF THE MOLECULAR COMPLEXES ACCOMPANYING MON OB1 MON OB2 AND CMA OB1 Ph.D. Thesis
Leo Blitz 1979 263 p
Avail: Univ. Microfilms Order No. 7916385

All three complexes are shown to be extended along the galactic plane with a longest extent which ranges from 88 pc for the Mon OB1 complex to 99 pc for the Mon OB2 complex. The complexes all appear to have well defined boundaries; extrapolation of the data to zero intensity indicates that the projected area of each complex is probably no more than approximately 40% to 50% larger than what is observed. The observations of all the molecular complexes mapped to date are used to calculate the number of OB associations in the Galaxy (4000). It is argued that the OB molecular complexes are the nucleation sites for nearly all of the massive star formation in the Galaxy, and that the number of giant molecular complexes does not greatly exceed the number of OB associations. Dissert. Abstr.

N79-28069 Rochester Univ., N. Y.
RAPID PHOTOMETRY OF CATACLYSMIC VARIABLE STARS Ph.D. Thesis
Steven Merle Arnold 1979 161 p
Avail: Univ. Microfilms Order No. 7914457

An exploratory color analysis with non-standard filters indicates that simultaneous multicolor photometry can be a powerful tool for investigating cataclysmic variables. In particular, it is shown that slow variations of a red component underlie the flickering in novalike variable AE Aqr, composite eclipses of novalike variable UX UMa are revealed in the color data, and rapid flickering in the peculiar X-ray binary AM Her has two sources, the redder of which is eclipsed at primary minimum. A geometric model is proposed for AM Her with a strong magnetic region localized on the primary's surface as the principal new feature. Eclipse timings of U Gem indicate an overwhelmingly significant period increase at the rate of 0.2 s per century. The large eclipse residuals are shown to be a necessary consequence of a flickering hot spot. Eclipse timings of UX UMa and EX Hya are consistent with existing ephemerides. Dissert. Abstr.

N79-28070 California Univ., Berkeley.
AN INTERFEROMETRIC AND MULTI-TRANSITIONAL STUDY OF THE ORION METHANOL MASERS Ph.D. Thesis
Demetrios Nicholas Matsakis 1978 88 p
Avail: Univ. Microfilms Order No. 7914692

The methanol source in the Orion was interferometrically mapped in two masing transitions of a wavelength of 1 cm: the 6 sub 2 yields 6 sub 1 (E) and the (7 sub 2 yields 7 sub 1)E. The source was found to consist of 10 components, with different Doppler velocities. Most of the components radiate in both of the mapped transitions, and have brightness temperatures or limits of 1000 to 4000 K. The molecular excitation was studied with a series of single-dish measurements, and a methanol transition, the 10 sub 2 yields 10 sub 1 (E), was detected. It was found that the temperature rotation temperature of the centimeter lines of methanol was around 110 K. It is concluded that the methanol masers are being excited by infrared emission from other objects in the vicinity. Dissert. Abstr.

N79-28071 California Univ., Berkeley.
PHOTOMETRY OF A COMPLETE SAMPLE OF FAINT GALAXIES Ph.D. Thesis
Richard Gordon Kron 1978 147 p

Avail: Univ. Microfilms Order No. 7914664

Techniques are described for the automatic measurement of colors and magnitudes of a complete sample of very faint galaxies. The observations consist of photographic surface photometry in two wavebands for approximately 20000 galaxies in two widely separated, high-altitude fields, each having an area of approximately 1080 square arc minutes. The photometric zero points are derived directly from faint stars in the same fields measured photoelectrically by other observers. The photometry of the galaxy sample is complete to a limit about ten times fainter than has been systematically investigated before. Results are interpreted with a simple model incorporating envolving spectral energy distributions for different types of galaxies. Dissert. Abstr.

N79-28072 Iowa State Univ. of Science and Technology, Ames.
THE HADRON SPECTRUM AT GROUND LEVEL, PART 1. THE STABILITY OF THE PERIOD OF CYGNUS x-3, PART 2 Ph.D. Thesis
Robert Keith Fickle 1979 151 p
Avail: Univ. Microfilms Order No. 7916193

Two separate research projects are described, the first of which was an experimental investigation of cosmic ray hadrons at ground level (atmosphere depth 990 g/sq cm) in the energy range 30 to 1000 GeV. The principal elements of the experimental apparatus were a shallow calorimeter to give a measure of incident energy and a threshold Cerenkov counter to provide velocity information. The second research project described is a study of the time variation of the periodically variable X-ray source Cygnus X-3. Data is presented from observations taken with the SAS-3 satellite in Jan. 1978 which, when combined with earlier data of other observers, indicates that the source's 4.8-hr period P is changing at a rate Dotted P/P = (5.1 + or - 1.3) times 10 to the -6th power/yr. Dissert. Abstr.

N79-28073*# National Aeronautics and Space Administration, Washington, D. C.
TROPOSPHERIC LIMITATIONS ON THE ACCURACY OF PHASE MEASUREMENT OF COORDINATES IN ASTRONOMY
A. F. Dravskikh, A. A. Stotskiy, A. M. Finkelshteyn, and P. A. Fridman May 1979 19 p refs Transl. into ENGLISH from Astrofiz. Issled., Izv. Spetsialnoy Astrofiz. Observ. (Leningrad), no. 10, 1978 p 108-109 Orginal language document was announced as A79-11161 Transl. by Sci. Transl. Serv., Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-75480) Avail: NTIS HC A02/MF A01 CSCL 03A

The effect of tropospheric fluctuation on the accuracy of phase measurements of coordinates is discussed. The nature of the averaging of the trophospheric effects, if N coordinate measurements of duration T with period mu are made, is investigated. Various averaging modes depending on the relation of the various time parameters are investigated. Equations taking into account the correlations between individual observations are presented. It is shown that the correlation interval between the individual observations is always greater than the fluctuation period of tropospheric inhomogeneities typical for a given baseline.
A.R.H.

N79-28074*# Illinois Univ., Urbana. Dept. of Astronomy.
THE 10 FEBRUARY 1977 LUNAR OCCULTATION OF URANUS. RADIUS, LIMB DARKENING, AND POLAR BRIGHTENING AT 6900 A
Richard R. Radick and William C. Tetley Jun. 1979 23 p refs
(Grant NGR-14-005-176)
(NASA-CR-158780; IAP-79-21) Avail: NTIS HC A02/MF A01 CSCL 03A

Contact timings, corrected for lunar limb effects, indicate an equatorial radius of 25700 + or - 500 km for the visible disk for Uranus. A modified Minnaert function is used to model limb darkening and polar brightening. Least squares fits to the observed light curve indicate that Uranus is slightly limb darkened in the passband of the observations (450 A FWHM centered near 6900 A) and that polar brightening is present. M.M.M.

N79-28075*# Illinois Univ., Urbana.
RADIO OBSERVATIONS OF ASTEROIDS: RESULTS AND PROSPECTS
John R. Dickel 1978 10 p refs
(Grant NGR-14-005-176)
(NASA-CR-158781) Avail: NTIS HC A02/MF A01 CSCL 03A

Radio observations of the asteroids can provide information on the thermal and dielectric properties of the surface materials and because the radio emission arises somewhat below the surface, the data give some indication of layering. Observational difficulty has limited the investigations to only 6 asteroids: 1 Ceres and 324 Bamberga appear to have a layer of dust covering a more compacted material; the data on 4 Vesta cannot be matched by any current models for the surface; and the results for 18 Melpomene, 31 Euphrosyne and 433 Eros are too incomplete for firm conclusions. Future possibilities include more accurate radiometry of a few selected asteroids of different taxonomic classes and actual resolution of some of the larger objects by aperture synthesis techniques. Author

N79-28076# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
BACKGROUND RADIATION IN SOME RECENT HIGH-RESOLUTION MEASUREMENTS IN GAMMA-RAY ASTRONOMY
J. M. daCosta, S. L. G. Dutra, D. Boclet (CNS, France), J. Claisse (CNS, France), Ph. Durouchox (CNS, France), E. Olivier (CNS, France), P. Pagnier (CNS, France), R. Rocchia (CNS, France), F. Albernhe (CSR, France), M. Frabel (CSR, France) et al May 1979 16 p refs Presented at 30th Meeting of Sociedade Brasileira para o Progresso da Ciencia
(INPE-1474-RPE/025) Avail: NTIS HC A02/MF A01

The existence of a background gamma-radiation at balloon heights is very inconvenient for the development of gamma-ray astronomy. Gamma-ray spectra measured during four recent balloon flights in Brazil with a large Ge(Li) high energy resolution gamma-ray spectrometer were analysed to study the local low-energy gamma-ray background. The results show that the local background contains contributions from gamma-rays produced in the earth's atmosphere, and also from gamma-ray induced in the detector and in its surrounding materials. The contribution of induced gamma-rays depends on the intensity of protons and neutrons at balloon heights. Comparison of results with previous results obtained by other authors at different latitudes shows a weaker background at 12 GV cut-off magnetic rigidity. Author

N79-28077*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
HIGH ENERGY X-RAY AND RADIO STUDIES OF SCORPIUS X-1
M. J. Coe, B. R. Dennis, J. F. Dolan, C. J. Crannell, G. S. Maurer, K. J. Frost, L. E. Orwig, W. Graf (Stanford Univ.), and K. M. Price (Stanford Univ.) May 1978 28 p refs
(NASA-TM-80298) Avail: NTIS HC A03/MF A01 CSCL 03A

The results from extended high energy X-ray observations of Scorpius XR-1 from the OSO-8 satellite are reported here. The source was observed for a total of 15 days in 1975, 1977 and 1978. Simultaneous 10.7 GHz and 4.75 GHz radio data were obtained during the 1978 observation, and low energy X-ray data during the 1975 and 1978 observations. The data reveals a lack of any correlation between the high energy X-rays and the other energy ranges. A three standard deviation upper limit of 22% was obtained for any modulation of the high energy flux with the binary period. No high energy tail was observed at any time. S.E.S.

N79-28078*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PULSE PHASE SPECTROSCOPY OF HERCULES X-1
S. H. Pravdo, R. W. Bussard, and N. E. White May 1979 12 p refs Submitted for publication
(NASA-TM-80299) Avail: NTIS HC A02/MF A01 CSCL 03A

The 6-18 keV and the 40-60 keV X-ray spectrum of Hercules X-1 were simultaneously observed with the A-2 experiment on

HEAO 1. By combining these measurements with the results of an earlier observation of this X-ray pulsar, evidence is found for a component of emission above 40 keV which is above an extrapolation from lower energies, by a factor which is pulse phase dependent. These data are compared to previous hard X-ray observations and possible models are discussed. J.M.S.

N79-28079# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
SIMULTANEOUS DETERMINATION OF THE COMPONENTS xi AND eta OF THE DEVIATION FROM THE VERTICAL WITH AN ASTROLAB PRISM: PART Vb: OBSERVATIONS AT 48deg LATITUDE DURING 1972 [SIMULTANBESTIMMUNGEN DER LOTABWEICHUNGSKOMPONENTEN xi AND eta MIT DEM PRISMENASTROLABIUM. Vb: BEOBACHTUNGEN IM 48 BREITENGRAD IM JAHR 1972]
Adolf Roedde 1977 122 p refs In GERMAN; ENGLISH summary
(Ser-B-199-Mitt-143) Avail: NTIS HC A06/MF A01

The astronomic determination of longitudes and latitudes performed simultaneously at 19 stations on the profile of the geoid at 48 deg of latitude is reported on. The components Xi and eta of the deviation from the vertical are also given.
Author (ESA)

N79-28080# European Southern Observatory, Munich (West Germany).
[EUROPEAN SPONSORED ASTRONOMICAL RESEARCH ACTIVITIES] Annual Report, 1977
1977 38 p
(AR-1977) Avail: NTIS HC A03/MF A01

Work done at the European Southern Observatory located at la Silla, Chile is reported. The Auxiliary Construction Program to provide the research center with necessary infrastructures, a description of the facilities, and financial and organizational matters relative to the operation of the installation are also commented on. Author (ESA)

N79-28081# Geneva Observatory (Switzerland).
CATALOGUE OF 'STRICT 0.01 MAG PHOTOMETRIC STAR BOXES'
M. Golan and N. Mandwewala 10 May 1978 32 p
(Publ-Ser-B-Fasc-2) Avail: NTIS HC A03/MF A01

The stellar content of all the (0.01 mag) (strict) photometric star boxes made using 7,082 stars measured in the UBV (B1B2V1G) system is given. Author (ESA)

N79-28082# British Aerospace Dynamics Group, Bristol (England). Electronic and Space Systems.
A PHASE STUDY OF A GRAZING INCIDENCE SOLAR TELESCOPE. VOLUME 1: EXECUTIVE SUMMARY Final Report
H. McD. Mooney Paris ESA Apr. 1978 160 p 2 Vol.
(Contract ESA-3196/77-NL-PP(SC))
(ESS/SS-814-Vol-1; ESA-CR(P)-1139-Vol-1) Avail: NTIS HC A08/MF A01

A design for a large grazing incidence XUV telescope was done based on WOLTER II sector optics and using mechanization of the main optical assembly to provide image stabilization and focal plane switching is presented. An examination of two principal instrument candidates for the focal plane is also outlined. The implications of the telescope design on ground assembly, integration, testing, cost, and on related programmatic aspects are also given. Author (ESA)

N79-28083# British Aerospace Dynamics Group, Bristol (England). Electronic and Space Systems.
GRIST: A STUDY OF A GRAZING INCIDENCE SOLAR TELESCOPE. VOLUME 2: TECHNICAL REPORT Final Report
H. Mcd. Mooney, M. Hammond, D. C. Clayton, B. T. Biddis, A. Derrick, J. Howard, K. Evans (Leicester Univ.), A. Franks (NPL), M. Stedman (NPL), B. Gale (NPL) et al Paris ESA Apr. 1978 328 p 2 Vol.
(Contract ESA-3196/77-NL-PP(SC))
(ESS/SS-814-Vol-2; ESA-CR(P)-1139-Vol-2) Avail: NTIS HC A15/MF A01

A study was done to design a large grazing incidence XUV telescope based upon WOLTER II sector optics and using mechanization of the main optical assembly to provide image stabilization and focal plane switching. An examination of two principal instrument candidates for the focal plan was also carried out. Results and conclusions of the engineering design activities of this study are reported. Author (ESA)

N79-28084# Royal Greenwich Observatory, Herstmonceux (England).
ASTRONOMICAL ACTIVITIES IN THE PERIOD OCTOBER 1, 1976 TO SEPTEMBER 30, 1977 Annual Report
F. G. Smith, D. V. Thomas, ed, and Joan E. Perry, ed 1978 58 p refs
Avail: NTIS HC A04/MF A01; Roy. Greenwich Obs., Hertsmonceux, Engl. £1

Astronomic activities for the period are presented. Policy and organization, national facilities, research programs, national and international services, internal facilities and services, and other subjects are discussed. Author (ESA)

N79-28085# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
ON THE SIMULTANEOUS DETERMINATION OF THE COMPONENTS xi eta OF THE DEVIATION OF THE VERTICAL USING AN ASTROLAB PRISM
Adolf Roedde 1978 127 p In GERMAN; ENGLISH summary
(SER-B-222-Mitt-146) Avail: NTIS HC A07/MF A01

The astronomic determinations of longitudes and latitudes performed simultaneously at 19 stations on the profile of the geoid at 48 deg latitude and at the satellite observation station of Wettzell is reported on. The calculation of the components xi and eta of the deviation of the vertical in the system RE 1950 is also presented. Observations during 1973 at 48 deg latitude and at the satellite tracking station, Wettzell, are included.
Author (ESA)

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N79-28086 California Univ., Berkeley.
GAUGE INVARIANT PERTURBATION THEORY IN SPATIALLY HOMOGENEOUS COSMOLOGY Ph.D. Thesis
Robert Theodore Jantzen 1978 109 p
Avail: Univ. Microfilms Order No. 7914649

The perturbations of the L.R.S. class A spatially homogeneous spacetimes are treated using Hamiltonian methods in conjunction with techniques from the theory of Lie group harmonic analysis. These latter techniques lead to a simple way of handling any set of tensor equations on these background spacetimes which has the same symmetry group as the spacetime metric. The Hamiltonian formulation is used to recover in a clean way the Bonanos equations for the perturbations of the perfect fluid models of the class of spacetimes under consideration. The conserved quantities associated with the four-dimensional symmetry group are evaluated and their role in the linearized Hamiltonian dynamics is discussed. The time-dependent linear canonical transformation of the linearized vacuum gravitational phase space adapted to Moncrief's gauge invariant decomposition is described in general for these models and evaluated explicitly for a class of lower dimensional harmonic modes. Dissert. Abstr.

N79-28087# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ON THE ORIGIN OF THE ELEMENTS: A BRIEF REVIEW
Jeronimo O. D. Jardim Apr. 1979 21 p refs
(INPE-1466-RPE/019) Avail: NTIS HC A02/MF A01

The processes of element synthesis are reviewed. Since none of the theories of nucleosynthesis in stars can explain the observed values of the elements from D through B, the cosmological synthesis is presented. The theory predictions, depending on a few parameters related to the early theory predictions, depending on a few parameters related to the early and current phases of the universe, are in good agreement with the observed values.
A.R.H.

N79-28088# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SOLAR AND LUNAR DAILY VARIATION AT LOW LATITUDES DURING QUIET AND DISTURBED DAYS
N. B. Trivedi and R. P. Kane Mar. 1979 25 p refs
(INPE-1435-RPE/011) Avail: NTIS HC A02/MF A01

The solar and lunar tides are studied for the H components at Pilar and Trelew as also for Sd sub 1 (Pilar) obtained from their difference, for 1958. It is shown from Sd sub 1 (Pilar) that the S sub q (solar daily variation) variation patterns are similar for quiet and disturbed days. In the lunar tide, there is a prominent third harmonic, larger than the second harmonic which is usually reported to be the predominant one at mid-latitudes. Author

N79-28089# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PERIODICITIES IN THE INTERPLANETARY MAGNETIC FIELD POLARITY
W. D. Gonzalez-Alarcon and A. L. C. Gonzalez Feb. 1979 28 p refs
(INPE-1425-RPE/005) Avail: NTIS HC A03/MF A01

A spectrum analysis for daily values of the interplanetary magnetic field observed and inferred from 1947 to 1976 shows a dominant peak with a period of about that of the solar rotation indicating that sector patterns live long enough for this modulation to occur. From a subsequent annual analysis of the data it was concluded that two-sector patterns are frequently observed during time intervals around solar maximum, whereas a four-sector structure can become dominant during smaller intervals at solar minimum. The occurrence of two-sectors around solar maximum covers a time interval (within one solar cycle) larger than that covered by the four-sectors at solar minimum. Therefore, a general predominance of two-sectors may be found. The possible origin of these structures is discussed in terms of a combined tilted-warped interplanetary current sheet model. G.Y.

N79-28090*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GLOBALLY BARYON SYMMETRIC COSMOLOGY, GUT SPONTANEOUS SYMMETRY BREAKING, AND THE STRUCTURE OF THE UNIVERSE
F. W. Stecker and R. W. Brown (Case Western Reserve Univ.) Jun. 1979 14 p refs
(NASA-TM-80306) Avail: NTIS HC A02/MF A01 CSCL 03B

Grand unified theories (GUT) such as SU(5), with spontaneous symmetry breaking, can lead more naturally to a globally baryon symmetric big bang cosmology with a domain structure than to a totally asymmetric cosmology. The symmetry is broken at random in causally independent domains, favoring neither a baryon nor an antibaryon excess on a universal scale. Because of the additional freedom in the high-energy physics allowed by such GUT gauge theories, new observational tests may be possible. Arguments in favor of this cosmology and various observational tests are discussed. Author

N79-28091*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COSMOLOGICAL BARYON NUMBER DOMAIN STRUCTURE FROM SYMMETRY-BREAKING IN GRAND UNIFIED FIELD THEORIES
R. W. Brown and F. W. Stecker Apr. 1979 12 p refs Submitted for publication
(NASA-TM-80281) Avail: NTIS HC A02/MF A01 CSCL 03B

It is suggested that grand unified field theories with spontaneous symmetry breaking in the very early big-bang can lead more naturally to a baryon symmetric cosmology with a domain structure than to a totally baryon asymmetric cosmology. The symmetry is broken in a randomized manner in causally independent domains, favoring neither a baryon nor an antibaryon excess on a universal scale. Arguments in favor of this cosmology and observational tests are discussed. J.M.S.

N79-28092*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A SEARCH FOR X-RAY EMISSION FROM RICH CLUSTERS, EXTENDED HALOS AROUND CLUSTERS, AND SUPERCLUSTERS
S. H. Pravdo, E. A. Boldt, F. E. Marshall, J. McKee, R. F. Mushotzky, B. W. Smith, and G. Reichert (California Univ., Berkeley) Jun. 1979 37 p refs Submitted for publication
(NASA-TM-80294) Avail: NTIS HC A03/MF A01 CSCL 03B

The all-sky data base acquired with the HEAO A-2 experiment was searched for X-ray emission on a variety of metagalactic size scales which were either predicted or previously detected. Results in the 0.2-60 keV energy range are presented. The optically richest clusters, including those from which a microwave decrement were observed, appear to be relatively underluminous in X-rays. Observations of Abell 576 show its luminosity to be less than earlier estimates, and moreover less than the luminosity predicted from its microwave decrement, unless the intracluster gas is a factor of approximately 10 hotter than in typical clusters. Near SC0627 there are two X-ray sources, and the identification of the dominant source with SC0627 is probably incorrect. New spectral observations of Abell 401 and 2147, possible superclusters, reveal that they have typical cluster spectra with iron line emission. G.Y.

N79-28093# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
ON THE RELIABILITY OF HEAVY ION DETECTION IN THE PLASMA FLOW NEAR M
O. L. Vaisberg and V. N. Smirnov 1978 24 p refs
(PR-427) Avail: NTIS HC A02/MF A01

Additional evidence supporting the reported detection of heavy ions in the solar wind-Mars interaction region based on plasma spectra data collected by satellites is given. Attempts to explain the observations by other effects are shown to be unconvincing. Other data from ion and electron traps support the spectrometer data on the detection of heavy ions. Author (ESA)

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N79-28094* National Aeronautics and Space Administration, Washington, D. C.
VOYAGER 2 JUPITER ENCOUNTER
26 Jun. 1979 53 p
(NASA-News-Release-79-86; P79-10088) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 03B

A NASA News Release is presented which contains the following: (1) general release; (2) two views of Voyager 2 flight past Jupiter; (3) Voyager mission summary; (4) Voyager 1 science results; (5) Jupiter science objectives; (6) Jupiter the planet and its satellites; (7) Voyager experiments; (8) planet comparison; (9) a list of Voyager science investigators and (10) the Voyager team. G.Y.

N79-28095 California Univ., Berkeley.
I-Xe DATING OF SILICATE AND TROILITE FROM IAB IRON METEORITES Ph.D. Thesis
Sidney Niemeyer 1978 79 p
Avail: Univ. Microfilms Order No. 7914717

The LAB iron meteorites may be related to the chondrites: siderophile elements in the metal matrix have chondritic abundances, and the abundant silicate inclusions are chondritic both in mineralogy and in chemical composition. Silicate and troilite (FeS) from IAB irons were analyzed by the I-Xe technique. Four IAB silicate samples gave well-defined I-Xe ages. Abundances of Ga, Ge, and Ni in metal from these meteorites are correlated with I-Xe ages of the silicate. The correlation between the trace elements in the metal and the I-Xe ages of the silicate provides one of the first known instances in which

another well-defined meteoritic property correlates with I-Xe ages. In addition, almost all the Xe-129 in Mundrabilla silicate (etched in acid) was correlated with Xe-128. How these two results support the validity of the I-Xe dating method is discussed.
Dissert. Abstr.

N79-28096*# National Aeronautics and Space Administration, Washington, D. C.
WHAT'S NEW ON THE MOON?
[1976] 26 p refs
(NASA-EP-131) Avail: NTIS MF A01; SOD HC $.70 CSCL 03B

As a result of the Apollo program and other lunar probes, questions that remained unsolved during centuries of speculation and scientific study can now be answered concerning the composition, core, surface, age, and history of the moon. Data obtained from lunar samples and instruments on the lunar surface are being used to gain insight into the history of the earth and the other planets, planetary evolution, the development of planetary magnetic fields, the nature of the solar wind, and how the Sun operates. Projects suggested for using the moon to increase understanding of geophysics are described. A.R.H.

N79-28097# Hawaii Univ., Honolulu. Inst. for Astronomy.
MARS SECTION OF REMOTE SENSING OF BASALTS IN THE SOLAR SYSTEM. CHAPTER 2 OF BASALTIC VOLCANISM IN THE SOLAR SYSTEM
Thomas B. McCord 27 Dec. 1978 22 p refs
(RSL-221) Avail: NTIS HC A02/MF A01

Remote sensing evidence for basalts on Mars is only suggestive. Spectral reflectance, IR spectroscopy, multispectral maps and X-ray fluorescence were used to study the minerals and rocks. Evidence for volcanic activity came from Viking Orbiter imagery and Viking Lander images. Compositional information came from: (1) earthbased spectral reflectance measurements of the martian surface and dust clouds; (2) XRF analyses of martian soils; (3) spectrophotometric measurements of soils and boulders at Viking landing sites; and (4) theoretical models of the chemistry and mineralogy of the mantle of Mars based on density measurements. G.Y.

N79-28098# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
STUDY ON THE ULTRAVIOLET RADIATION OF THE ATMOSPHERE OF VENUS
V. G. Krut, N. N. Romanova, A. S. Smirnov, G. Blamont, and G. Bertau 1979 17 p In ENGLISH and RUSSIAN
Avail: NTIS HC A02/MF A01

Multichannel spectrometers with a fixed concave holographic grating were mounted on the flyby vehicles of the Venera-11 and Venera-12 stations to study scattered UV radiation in the atmosphere of Venus (the first-order platinum-coated grating had a curvature radius of 990 mm and 3200 lines per mm). The spectrometer was built around 10 independent detectors recording radiation in the He 11, He 1, Ne 1, (O 11, Ar 1), Ar 1, H 1, O 1, CO, and C 1 lines. Pulses for all detectors were recorded by linear counters and interrogated every second. The measurement duration was about 2 hours and the planetary disk was sighted during half an hour. The scheme of the planetary disk scanning, sections of the planetary disk in some lines, and the trajectories of the space stations are presented in graphic form. A.R.H.

N79-28099# Naturhistorisches Museum, Vienna (Austria). Div. of Mineralogy and Petrology.
CAPE YORK: THE EXTRAORDINARY MINERALOGY OF AN ORDINARY IRON METEORITE AND ITS IMPLICATION FOR THE GENESIS OF III AB IRONS
A. Kracher, G. Kurat, and V. F. Buchwald (Technical Univ. of Denmark, Lyngby) 1977 11 p refs Repr. from Geochem. J., vol. 11, 1977 p 207-217
Avail: NTIS HC A02/MF A01

A study of accessory minerals in the Cape York iron meteorite was carried out with the electron microprobe. Phases analyzed include chromite, sphalerite, two closely related potassium bearing sulfides, silica, and native copper. Four phosphate minerals were found: one chemically similar to buchwaldite, but rather rich in iron, one corresponding to terrestrial maricite, and two more, which are new minerals on the basis of microprobe analysis. Evidence from the composition of accessory minerals as well as texture elucidates some details of the fractional crystallization of group 3 AB parent melt. A modification of the fractional crystallization model is therefore proposed. Sulfide nodules originated as droplets of an immiscible sulfur rich liquid that continuously segregated from the parent melt during crystallization of the metal. The modified model also explains the Ni/Cr anticorrelation and the high abundance of sulfur in group 3 AB irons which could not be satisfactorily explained by previous models. M.M.M.

N79-28100*# Missouri Univ. -Rolla. Dept. of Chemistry.
TRANSPORT PROPERTIES IN THE ATMOSPHERE OF JUPITER Semiannual Progress Report, Jan. - Jun. 1979
Louis Biolsi, Jr. Jun. 1979 27 p refs
(Grant NsG-1369)
(NASA-CR-158783) Avail: NTIS HC A03/MF A01 CSCL 03B

Activities reported include: (1) testing of the computer program used to obtain transport properties for the Hulburt-Hirschfelder potential; (2) calculation of transport properties for the C2-C interaction; (3) preliminary calculations for the C2-C2 interaction; (4) calculation of transport properties for the C2H-He interaction; (5) consideration of the effect of inelastic collisions on the transport properties; and (6) the use of the Hulburt-Hirschfelder potential to model ion-atom interactions.
A.R.H.

N79-28101*# University of Northeast Louisiana, Monroe. Dept. of Geosciences.
THICKNESS OF WESTERN MARE BASALTS Final Report
Rene A. DeHon 15 Jul. 1979 65 p refs
(Grant NsG-7420)
(NASA-CR-158784) Avail: NTIS HC A04/MF A01 CSCL 03B

An isopach map of the basalt thickness in the western mare basins is constructed from measurements of the exposed external rim height of partially buried craters. The data, although numerically sparse, is sufficiently distributed to yield gross thickness variations. The average basalt thickness in Oceanus Procellarum and adjacent regions is 400 m with local lenses in excess of 1500 m in the circular maria. The total volume of basalt in the western maria is estimated to be in the range of 1.5 x 10 to the 6th power cu km. The chief distinction between the eastern and western maria appears to be one of basalt volumes erupted to the surface. Maximum volumes of basalt are deposited west of the central highlands and flood subjacent terrain to a greater extent than on the east. The surface structures of the western maria reflect the probability of a greater degree of isostatic response to a larger surface loading by the greater accumulation of mare basalt. A.R.H.

N79-28102*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CONSIDERATION OF SAMPLE RETURN AND THE EXPLORATION STRATEGY FOR MARS
Donald C. Bogard, Michael B. Duke, Everett K. Gibson, John W. Minear, Larry E. Nyquist, and William C. Phinney Mar. 1979 91 p refs
(NASA-TM-58213; JSC-14864) Avail: NTIS HC A05/MF A01 CSCL 03B

The scientific rationale and requirements for a Mars surface sample return were examined and the experience gained from the analysis and study of the returned lunar samples were incorporated into the science requirements and engineering design for the Mars sample return mission. The necessary data sets for characterizing Mars are presented. If further analyses of surface samples are to be made, the best available method is for the analysis to be conducted in terrestrial laboratories. A.R.H.

N79-28103*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
VOYAGER 1 PLANETARY RADIO ASTRONOMY OBSERVATIONS NEAR JUPITER
J. W. Warwick (Science Applications, Inc., Boulder, Colo.), J. B. Pearce (Science Applications, Inc., Boulder, Colo.), A. C. Riddle (Science Applications, Inc., Boulder, Colo.), J. K. Alexander, M.

D. Desch, M. L. Kaiser, J. R. Thieman, T. B. Carr (Florida Univ., Gainesville), S. Gulkis (JPL), and A. Boischot (Observatoire de Paris, France) May 1979 16 p refs
(NASA-TM-80287) Avail: NTIS HC A02/MF A01 CSCL 03B

Results are reported from the first low frequency radio receiver to be transported into the Jupiter magnetosphere. Dramatic new information was obtained both because Voyager was near or in Jupiter's radio emission sources and also because it was outside the relatively dense solar wind plasma of the inner solar system. Extensive radio arcs, from above 30 MHz to about 1 MHz, occurred in patterns correlated with planetary longitude. A newly discovered kilometric wavelength radio source may relate to the plasma torus near Io's orbit. In situ wave resonances near closest approach define an electron density profile along the Voyager trajectory and form the basis for a map of the torus. Studies in progress are outlined briefly. A.R.H.

N79-28104*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MAGNETIC FIELD STUDIES AT JUPITER BY VOYAGER 1: PRELIMINARY RESULTS
Norman F. Ness, Mario H. Acuna, Ronald P. Lepping, Leonard F. Burlaga, Kenneth W. Behannon, and Fritz M. Neubauer (Technische Univ., Braunschweig, West Germany) 11 Apr. 1979 26 p refs Revised
(NASA-TM-80288) Avail: NTIS HC A03/MF A01 CSCL 03B

Results obtained by the Goddard Space Flight Center magnetometers on Voyager 1 concerning the large scale configuration of the Jovian bow shock and magnetopause, and the magnetic field in both the inner and outer magnetosphere are highlighted. There is evidence that a magnetic tail extending away from the planet on the nightside is formed by the solar wind-Jovian field interaction. This is much like Earth's magnetosphere but is a new configuration for Jupiter's magnetosphere not previously considered from earlier Pioneer data. Magnetic field perturbations associated with intense electrical currents (approximately 5 x 10 to the 6th power amps) flowing near or in the magnetic flux tube linking Jupiter with the satellite Io and induced by the relative motion between Io and the co-rotating Jovian magnetosphere are analyzed and interpreted. These currents may be an important source of heating the ionosphere and interior of Io through Joule dissipation. A.R.H.

N79-28105# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
ON THE POSSIBILITY OF DETERMINING THE VENUS MAGNETIC MOMENT FROM MAGNETIC MEASUREMENTS IN THE TAIL
E. M. Dubinin, I. M. Podgorny, Y. N. Potanin, and S. I. Shkolnikova 1978 16 p refs
(PR-432) Avail: NTIS HC A02/MF A01

A wax ball was used as a Venus model. Evaporation and ionization of wax occured in an artificial solar wind, surrounding the model with a plasma shell. The interaction of the supersonic and super-alfven flow of the collisionless plasma with the plasma shell results in the formation a magnetic tail similar to the geomagnetic tail. Control experiments using a copper ball in the isolation shell, then removing it, showed that induced currents responsible for the tail formation are produced by the Lorentz electric field. Analysis of the data obtained in the experiment described, and a comparison of the data with results from space show that it is not necessary to attribute the intrinsic magnetic moment to the planet in order to explain the existence of the Venus tail. Author (ESA)

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N79-28106 Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
SYNOPTIC RADIO MAPS OF THE SUN AT 3.3mm, 1970-1973
Earle B. Mayfield and Fred I. Shimabukuro Boulder, Colo. World Data Center A for Solar-Terrestrial Physics May 1978 35 p refs
(UAG-66) Avail: National Geophysical and Solar-Terrestrial Data Center, NOAA, Boulder, Colo. HC $.75

A millimeter radio telescope, located in El Segundo, California, was used to obtain maps of the whole solar disk at 90 GHz (3.3-mm wavelength) routinely on a near daily basis from 1966 through 1977. Since then only infrequent observations of the Sun have been made to calibrate the radiometer. The format used in presenting millimeter radio observations is the same as that employed for previous results and is based on investigations of variations in the 3.3-mm emission and its correlation with photospheric magnetic fields, faculae, and centers of activity. The regions of enhanced millimeter emission are well-defined, stable features that can be readily identified and followed during their disk passage. The relatively infrequent, transient phenomena associated with flares, usually lie at the resolution limit of the antenna. As a result, synoptic maps are considered not only the most informative presentation but the most concise. Separate maps are available for those individuals who require more detailed data or individual maps for specific days. A.R.H.

N79-28107 Institut d'Aeronomie Spatiale de Belgique, Brussels.
KINETIC VERSUS HYDRODYNAMIC SOLAR WIND MODELS
J. Lemaire 1978 21 p refs Presented at Conf. Highlights of Solar Phys., Toulouse, 8-10 Mar. 1978 Submitted for publication
(Aeronomica-Acta-A-196-1978) Avail: Issuing Activity

The main hydrodynamic approximations of the general transport equations are given with their limits of validity. It is shown that these approximations are not applicable for detailed studies of the solar wind beyond radial distances exceeding 5 to 10 solar radii. Beyond this heliocentric distance (i.e. in the solar ion-exosphere) kinetic approximations should be used. An example of a kinetic solar wind model is illustrated and discussed. Although a certain number of moments of the particles velocity distributions calculated by the kinetic method fit the values observed at 1 A.U. very well, there is, however, a much too large temperature anisotropy. This leads to more elaborate kinetic models where the effect of Coulomb collisions would be included as a first order correction for the velocity distribution of the solar wind protons and electrons. Author (ESA)

N79-28108# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RELATIONSHIP BETWEEN SUNSPOT NUMBERS DURING YEARS OF SUNSPOT MAXIMUM AND SUNSPOT MINIMUM
R. P. Kane and N. B. Trivedi May 1979 11 p refs Submitted for publication
(INPR-1485-RPE/031) Avail: NTIS HC A02/MF A01

It is known that sunspot activity has a strong dependence on heliolatitudes. The possibility that the evidence is depicted not in the polar field strength, as such, but in sunspot numbers in some heliolatitude belts was examined. Data was supplied and correlated for the numbers of sunspots in different heliolatitudes (5 degree belts from solar equator, north and south). These were combined with 10 degree belts. The annual average Wolf's number of sunspots at the maximum in years following the minimum is given. Results of data correlation indicate that the intensity of the future sunspot activity is manifested in the number of sunspots developing in the heliolatitude belts 20 degrees to 40 degrees during sunspot minimum. The analysis shows that the starting number is probably proportional to the intensity of the maximum solar activity that follows. G.Y.

N79-28109*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A THEORY OF LOCAL AND GLOBAL PROCESSES WHICH AFFECT SOLAR WIND ELECTRONS. 2: EXPERIMENTAL SUPPORT
J. D. Scudder and S. Olbert (MIT, Cambridge) May 1979 62 p refs Submitted for publication
(Grant NGL-22-009-015)
(NASA-TM-79628) Avail: NTIS HC A04/MF A01 CSCL 03B

The microscopic characteristics of the Coulomb cross section show that there are three natural subpopulations for plasma electrons: the subthermals with local kinetic energy E < kT sub c; the transthermals with kT sub c < E < 7 kT sub c and the extrathermals E > 7 kT sub c. Data from three experimental groups on three different spacecraft in the interplanetary medium over a radial range are presented to support the five interrelations projected between solar wind electron properties and changes in the interplanetary medium: (1) subthermals respond primarily to local changes (compression and rarefactions) in stream dynamics; (2) the extrathermal fraction of the ambient electron density should be anti-correlated with the asymptotic bulk speed; (3) the extrathermal 'temperature' should be anti-correlated with the local wind speed at 1 AU; (4) the heat flux carried by electrons should be anti-correlated with the local bulk speed; and (5) the extrathermal differential 'temperature' should be nearly independent of radius within 1 AU. A.R.H.

N79-28110*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A THREE-DIMENSIONAL MODEL OF CO-ROTATING STREAMS IN THE SOLAR WIND. 2: HYDRODYNAMIC STREAMS
Victor J. Pizzo Apr. 1979 69 p refs Submitted for publication
(NASA-TM-80276) Avail: NTIS HC A04/MF A01 CSCL 03B

Theoretical aspects of corotating solar wind dynamics on a global scale are explored by means of numerical simulations executed with a nonlinear, inviscid, adiabatic, single-fluid, three-dimensional (3-D) hydrodynamic formulation. A simple, hypothetical 3-D stream structure is defined on a source surface located at 35 solar radius and carefully documents its evolution to 1 AU under the influence of solar rotation. By manipulating the structure of this prototype configuration at the source surface, it is possible to elucidate the factors most strongly affecting stream evolution: (1) the intrinsic correlations among density, temperature, and velocity existing near the source; (2) the amplitude of the stream; (3) the longitudinal breadth of the stream; (4) the latitudinal breadth of the stream; and (5) the heliographic latitude of the centroid of the stream. A.R.H.

N79-28111# Laboratorio di Ricerca e Technologia per lo Studio del Plasma nello Spazio, Frascati (Italy).
LOCAL INSTABILITIES OF ALFVEN WAVES IN HIGH SPEED STREAMS
B. Bavassano, M. Dobrowolny, and G. Moreno Jan. 1978 42 p refs
(LPS-78-2) Avail: NTIS HC A03/MF A01

A two fluid stability analysis of an inhomogeneous solar wind plasma leads to a prediction of possible instabilities in both Alfven and magnetoacoustic waves driven by local velocity gradients. A detailed study, based on Pioneer 6 magnetic and plasma data relative to several high speed streams in the solar wind, on the direction of propagation of the transverse waves which are found within the streams, and on their association with velocity gradients within the stream structure was made. The analysis shows that the observed Alfven waves are consistent with the hypothesis of local generation through instabilities where velocity shear leads in fact to excitation of incompressible waves in directions almost parallel to the magnetic field. Author (ESA)

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N79-28112 California Univ., Berkeley.
THE NUCLEAR AND ATOMIC PHYSICS GOVERNING CHANGES IN THE COMPOSITION OF RELATIVISTIC COSMIC RAYS Ph.D. Thesis
Lance Wayne Wilson 1978 101 p
Avail: Univ. Microfilms Order No. 7914813

The major emphasis is on developing the proper set of formulae and error estimates for each of the atomic and nuclear processes that govern the composition of the cosmic rays between lithium and nickel. In particularly, it is shown that errors of approximately a factor of two exist in the standard (Bohr) cross sections for stripping, that the correction function from high energy photoionization needs to be introduced into the standard cross section for radiative attachment, and that because the half-life of a fast nucleus with at most one K-shell electron can differ from the half-life of a neutral atom, several laboratory-based values need correction. The framework used to assemble and correct these quantities is a matrix formalism for a leaky box model. Dissert. Abstr.

N79-28113 California Univ., Berkeley.
MEASUREMENT OF THE ISOTOPIC COMPOSITION OF THE IRON GROUP ELEMENTS IN THE GALACTIC COSMIC RADIATION Ph.D. Thesis
Gregory Tarle 1978 65 p
Avail: Univ. Microfilms Order No. 7914785

IRIS, a telescope consisting of a large-area, precision Cerenkov detector, scintillators, spark chambers, and a passive stack of Lexan polycarbonate track detectors, was exposed to the primary cosmic radiation for 6.6 sq msr hr in a balloon flight in 1976. This measurement yielded the isotopic composition of the iron-group elements Cr, Mn, Fe and Ni with an average mass resolution of 0.65 amu for the energies 320-500 MeV/amu at the detector. This experiment places the most severe constraints to date on deviations from solar system composition of the source of the cosmic radiation. We place upper limits of 10% on the ratios Fe-54/Fe-56 and Fe-58/Fe-56. The isotopic measurements of Fe and Ni preclude the possibility that these cosmic rays were produced in a single e-process zone. The mean mass of Mn is less than 55, indicating the presence of electron capture species produced by spallation. Dissert. Abstr.

N79-28114*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE MEAN FREE PATH OF LOW RIGIDITY COSMIC RAYS
M. L. Goldstein May 1979 17 p refs Submitted for publication
(NASA-TM-80290) Avail: NTIS HC A02/MF A01 CSCL 03B

A simple heuristic argument is presented which suggests that the large rigidity independent mean free paths observed for low rigidity solar and galactic cosmic rays can be understood in terms of weak turbulence diffusion theory if one assumes that the interplanetary magnetic turbulence consists of a combination of Alfven waves propagating with constant field magnitude and a small (approximately 5-10%) admixture of compressive fluctuations. Author

N79-28115*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GAMMA-RAY BURST OBSERVATIONS FROM HELIOS-2
T. L. Cline, U. D. Desai, G. Pizzichini, A. Spizzichino, J. H. Trainor, R. W. Klebesadel (LASL, New Mexico), and H. Helnken (Smithsonian Astrophysical Observatory, Cambridge, Mass.) May 1979 16 p refs Submitted for publication
(NASA-TM-80284) Avail: NTIS HC A02/MF A01 CSCL 03B

Observations of five gamma-ray bursts made with the solar orbiter Helios-2 are reported. Wavefront timing from Helios-2, at distances of up to 1.98 AU, to Vela-5A and -6A, in Earth orbit, provides source location bands as narrow as 2 arc minutes, although several degrees in length. The burst intensities and time profiles measured in interplanetary space by Helios-2 are the same as those observed near the earth, ruling out a narrow-beam interplanetary origin model. Also, the source direction bands for these events are inconsistent with the directions of all known celestial X-ray objects, X-ray bursters and high-energy gamma-ray source regions. The gamma-ray burst source objects therefore appear to form a distinct class from all lower energy X-ray or higher energy gamma ray emitters. Author

N79-28116*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

EXTRATERRESTRIAL HIGH ENERGY NEUTRINO FLUXES
F. W. Stecker Jun. 1979 15 p refs Submitted for publication
(NASA-TM-80304) Avail: NTIS HC A02/MF A01 CSCL 03B

Using the most recent cosmic ray spectra up to 2x10 to the 20th power eV, production spectra of high energy neutrinos from cosmic ray interactions with interstellar gas and extragalactic interactions of ultrahigh energy cosmic rays with 3K universal background photons are presented and discussed. Estimates of the fluxes from cosmic diffuse sources and the nearby quasar 3C273 are made using the generic relationship between secondary neutrinos and gammas and using recent gamma ray satellite data. These gamma ray data provide important upper limits on cosmological neutrinos. Quantitative estimates of the observability of high energy neutrinos from the inner galaxy and 3C273 above atmospheric background for a DUMAND type detector are discussed in the context of the Weinberg-Salam model with sq sin theta omega = 0.2 and including the atmospheric background from the decay of charmed mesons. Constraints on cosmological high energy neutrino production models are also discussed. It appears that important high energy neutrino astronomy may be possible with DUMAND, but very long observing times are required. Author

N79-28117# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CODIFICATION AND DECODIFICATION OF THE PULSE AMPLITUDE ORIGINATING FROM SPACE RADIATION [CODIFICACAO E DECODIFICACAO DE AMPLITUDE DE PULSO PROVENIENTE DE RADIACAO DO ESPACO]
Renato Senador, Etiene M. Schneider, and Inacio M. Martin Mar. 1979 16 p refs In PORTUGUESE
(INPE-1430-NTE/146) Avail: NTIS HC A02/MF A01

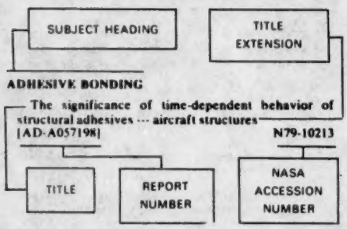
The scintillator described is able to furnish information about the nature of the gamma radiation near the atmosphere. The distribution of the amplitude of the detected photon pulses and the conversion to digital data is described. The information is then transmitted to earth and the decodification is recorded in a magnetic tape. Transl. by M.M.M.

99 GENERAL

No abstracts in this category.

SUBJECT INDEX

Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7050).

A

ABERRATION
Image quality of a Wolter-1 type X-ray telescope under particular contrast reduction conditions due to diffuse reflection
[MPI-PAE/EXTRATERR-145] N79-27984

ABLATION
Hypersonic boundary layers
N79-27441

ABLATIVE MATERIALS
Roughness phenomena in turbulent flow
N79-27446
Analysis of charring ablators
N79-27447

ABSORPTION CROSS SECTIONS
Measurements of differential cross sections for electronic excitations on Na-Hg K-Hg, and Cs-Hg systems
[MPIS-13/1978] N79-27952

ABSORPTION SPECTRA
Energy transfer in anisotropic systems. A: Exciton migration in substitutionally disordered one-dimensional solids. B: The spectroscopy of molecules adsorbed on metal surfaces
N79-28010

ACCELERATION [PHYSICS]
Dynamics of the boost phase
N79-27212
Animal endurance to recurrent impact accelerations
N79-27833

ACCELERATION STRESSES [PHYSIOLOGY]
Simulation of fluid-electrolyte metabolism as a means of preventing orthostatic instability in the crew of the second expedition aboard the Salyut-4 station
N79-27819

ACCELERATION TOLERANCE
Balance training of the equilibrium organ and its effect on flight strategy
N79-27074
The effect of a reclined sitting position on psychomotor performance during exposure to high, sustained +Gsub z acceleration
[FPRC-1362] N79-27856
The effect of acceleration and seat back angle on performance of a reaction time task
[FPRC-1364] N79-27857
The influence of seat back angle on acceleration tolerance
[FPRC-1365] N79-27858

ACCEPTOR MATERIALS
Hydrogen in germanium
[LBL-7996] N79-28030

ACCESSORIES
Determining the dynamic response due to an imbalance at the attachments of a motor on a pod --- caused by rotor blade loss
N79-27171

ACCIDENT INVESTIGATION
Remote sensing of hydrocarbon pollution
N79-27725

ACETONE
Chemiluminescence of dimethyldioxetane: Unimolecular generation of excited singlet and triplet acetone. Chemically initiated electron-exchange luminescence, the primary light generating reaction
[AD-A068920] N79-27281

ACETYL COMPOUNDS
Electrochemical fluorination of trichloroethylene and N, N-dimethyltrifluoroacetamide
[NASA-TM-79188] N79-27242

ACIDITY
Acidity distribution on oxide surfaces
N79-27258

ACOUSTIC DUCTS
On the attenuation of sound by three-dimensionally segmented acoustic liners in a rectangular duct
[NASA-TM-80118] N79-27932
Analysis, design, and test of acoustic treatment in a laboratory inlet duct
[NASA-CR-3161] N79-27934

ACOUSTIC EMISSION
Trailing edge noise data with comparison to theory
[NASA-TM-79208] N79-27930
Acoustic emission sources in brittle solids --- conferences
[LBL-8335] N79-27937

ACOUSTIC MEASUREMENTS
An experimental study of sound radiation from hyperboloidal inlet ducts
[NASA-TM-80109] N79-27931
Studies of the acoustic transmission characteristics of coaxial nozzles with inverted velocity profiles: Comprehensive data report --- nozzle transfer functions
[NASA-CR-159628] N79-27933

ACOUSTIC PROPAGATION
Ray calculations of ocean sound channels using a pocket programmable calculator and extended forms of the Hirsch-Carter mathematical model with tables of the incomplete beta function
[AD-A069168] N79-27936

ACOUSTICS
Acoustical particle sizing device
N79-27715
Acoustical speckle interferometry
[AD-A067664] N79-27935

ACOUSTO-OPTICS
On the use of the photoacoustic effect for investigating phase-transitions in solids
[INPE-1476-RPE/027] N79-28026

ACRYLIC RESINS
Dilute solution viscosity of water reducible acrylic resins
N79-27303

ADAPTATION
Possibilities of preventing adverse reactions in simulating the acute period of adaptation to weightlessness
N79-27825

ADAPTIVE FILTERS
Noise adaptive filter
N79-27216
Application of a correlation discriminant operator to perturbational adaptive algorithms
[AD-A068890] N79-27362

ADHESION
Adhesive material transfer in the erosion of an aluminum alloy
[NASA-TM-79165] N79-27306
Colloid and other forces in particle adhesion and particle removal: A review
N79-27318

ADHESION TESTS
Experimental study of bonding agents used in mechanical assemblies
[CETIM-1-2J-03-0] N79-27316

ADHESIVE BONDING
The influence of the forces of interaction between solids on their adhesiveness
N79-27317
On the calculation of yield strength for various assemblies
[CETIM-1-1G-06-0] N79-27541

AERODYNAMIC CHARACTERISTICS
Influence of optimized leading-edge deflection and geometric anhedral on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- langley 7 by 10 foot tunnel
[NASA-TM-80083] N79-27095
A flight investigation of basic performance characteristics of a teetering-rotor attack helicopter
[NASA-TM-80112] N79-27097
Wind tunnel measurements of dynamic derivatives in the German Federal Republic
[IFD-5-78] N79-27107
Investigations of interference effects in a wind tunnel caused by a model support strut on a reflection plane mounted half model
[FFA-TN-AU-1335:2] N79-27109
Aerodynamics of a tilt-nacelle V/STOL propulsion system
[NASA-TM-78606] N79-27138
Aerodynamic performance of the 17-metre-diameter Darrieus wind turbine
[SAND-78-1737] N79-27670

AERODYNAMIC CONFIGURATIONS
Influence of optimized leading-edge deflection and geometric anhedral on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- langley 7 by 10 foot tunnel
[NASA-TM-80083] N79-27095
Calculation of pressure distribution for a wing-body combination at subsonic Mach numbers
[FFA-TN-AU-1091] N79-27110
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 1: Numerical aspects
N79-27458
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 2: Calculational aspects of solving the large systems of linear algebraic equations on a digital computer
N79-27459

AERODYNAMIC DRAG
An exploratory investigation of the effect of a plastic coating on the profile drag of a practical-metal-construction sailplane airfoil
[NASA-TM-80092] N79-27098
Base drag
N79-27209

AERODYNAMIC INTERFERENCE
The consideration of wing-body and wing-tail interference in missile design
N79-27213

AERODYNAMIC LOADS
Unsteady rotor blade loading in an axial compressor with steady-state inlet distortions
N79-27176
Supersonic unstalled flutter
N79-27181

AERODYNAMIC NOISE
Trailing edge noise data with comparison to theory
[NASA-TM-79208] N79-27930

AERODYNAMIC STABILITY
Prediction of aeroelastic instabilities in rotorcraft
N79-27159
Study in a straight cascade wind tunnel of aeroelastic instabilities in compressors
N79-27178

AERODYNAMIC STALLING
Rotating stall in axial flow compressors
N79-27430

AERODYNAMICS
Aeronautical Engineering: A continuing bibliography with indexes, supplement 110
[NASA-SP-7037(110)] N79-27068
Science and Technology of Low Speed and Motorless Flight. Third International Symposium
[NASA-CR-2085] N79-27070
Sixty years of aeronautical research, 1917-1977 --- Langley Research Center
[NASA-EP-145] N79-27089
Missile Aerodynamics, volume 1
[VKI-LECTURE-SERIES-67-VOL-1]
N79-27201
A brief review of air-flight weapons
N79-27202
General weapon aerodynamics
N79-27203
Aerodynamic controls
N79-27204
Weapon/aircraft interactions
N79-27205

Spoiler controls
N79-27207
Missile configuration design options
N79-27208
High incidence aerodynamics
N79-27210
Missile Aerodynamics, volume 2 [VKI-LECTURE-SERIES-67-VOL-2]
N79-27211
Dynamics of the boost phase
N79-27212

AEROELASTICITY
The influence of feedback on the aeroelastic behavior of tilt proprotor aircraft including the effects of fuselage motion [NASA-CR-158778] N79-27125
Stresses, vibrations, structural integration and engine integrity [including aeroelasticity and flutter] [AGARD-CP-248] N79-27148
Prediction of aeroelastic instabilities in rotorcraft
N79-27159
Study in a straight cascade wind tunnel of aeroelastic instabilities in compressors
N79-27178

AERONAUTICAL ENGINEERING
Aeronautical Engineering: A continuing bibliography with indexes, supplement 110 [NASA-SP-7037[110]] N79-27068
Sixty years of aeronautical research, 1917-1977 --- Langley Research Center [NASA-EP-145] N79-27089

AEROSOLS
Acoustical particle sizing device
N79-27715
Sulfur and nitrogen compounds in urban aerosols [BNL-25223] N79-27723
The 911 years of microparticle deposition at the South Pole: A climatic interpretation
N79-27732
Response characteristics of Knollenberg light-scattering aerosol counters [AD-A067701] N79-27750
Investigation of near surface aerosol properties in arid regions [AD-A068554] N79-27753

AEROSPACE ENGINEERING
GRIST: A study of a grazing incidence solar telescope. Volume 2: Technical report [ESS/SS-814-VOL-2] N79-28083

AEROSPACE ENVIRONMENTS
Preparation of guinea pig macrophage for electrophoretic experiments in space [NASA-CR-158777] N79-27814
Space biology and aerospace medicine, v. 13, no. 3, 1979 [JPRS-73784] N79-27817
Brassboard Fault Tolerant Spaceborne Computer [BFTSC], volume I [AD-A068553] N79-27869

AEROSPACE MEDICINE
Space biology and aerospace medicine, v. 13, no. 3, 1979 [JPRS-73784] N79-27817

AEROSPACE SCIENCES
Indian national committee for space research report to COSPAR
N79-27194

AFTERBURNING
Integration of an airframe with a turbofan and afterburner system
N79-27172

AGRICULTURE
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington [E79-10212] N79-27629
Solar energy for agricultural and industrial process heat [DOE/CS-0053] N79-27688
A modification of the likelihood equations for normal classes with field structure, preliminary report [NASA-CR-160266] N79-27894

AILERONS
A general method for the layout of ailerons and elevators of gliders and motorplanes
N79-27076

AIR
Influence of chemical reactions and other parameters on the hypersonic boundary layer in air [KU-RZ-12/1977] N79-27106
An experimental study of the sensitiveness of unconfined hydrocarbon-air mixtures to direct detonative initiation [PERME-TR-44] N79-27340

AIR CARGO
Cargo Logistics Airlift Systems Study [CLASS]. Volume 3: Cross impact between the 1990 market and the air physical distribution systems, book 1 [NASA-CR-158914] N79-27112
Airfreight forecasting methodology and results
N79-27114
The 1990 direct support infrastructure
N79-27115

AIR CONDITIONING
Room heat storage processes [BMFT-FB-T-78-14] N79-27711

AIR FILTERS
Economic comparison of fabric filters and electrostatic precipitators for particulate control on coal-fired utility boilers
N79-27610

AIR FLOW
A numerical model of flow above gentle topography with changes in surface roughness
N79-27550
Development and validation of a three-dimensional wind model for air quality analysis in complex terrain
N79-27551
Bivane studies of air flow over irregular terrain
N79-27552

AIR INTAKES
Dynamic pressure loads in the air induction system of the tornado fighter aircraft
N79-27168
The effect of intake conditions on supersonic flutter in turbofan engines
N79-27175

AIR POLLUTION
Proceedings of the Ninth International Technical Meeting on Air Pollution Modeling and its Application [REPT-103] N79-27543
A method of computing maximum ground-level concentrations of SO2 under prolonged stagnation conditions
N79-27546
Dispersion from chimneys downwind of cubical buildings: A wind-tunnel study
N79-27547
Field investigations of the dispersion of pollution across a ridge
N79-27548
Modelling the effect of separated wakes behind hills and buildings on pollutant dispersion
N79-27549
Parameterizing atmospheric diffusion
N79-27553
Theoretical background for the choice of stability parameters --- for modeling air pollution diffusion
N79-27554
Use of wind fluctuation statistics to estimate dispersion near roadways
N79-27558
Stack plume characterization and model assessment with lidar data
N79-27562
Objective wind field pattern characterization
N79-27570
Representation of inter grid sources in pseudospectral dispersion models
N79-27572
Verification of the MADCAP model of photochemical air pollution in the San Diego air basin
N79-27573
Point source air pollution modeling
N79-27574
Regional transport and photochemical model of atmospheric sulfates
N79-27575
The European regional model of air pollution [EURMAP] and its application to short term episodes
N79-27576
A multi-scale dispersion model for local and regional sulfur dioxide/sulfate concentrations: Formulation and initial evaluation
N79-27578
The ratio of peak 1-hour average concentrations to peak concentrations of other averaging times for various pollutants and differing sources
N79-27582
The application of a mathematical model to the estimation of the concentrations of pollutants in European cities
N79-27586
Mathematical micromodel for local diffusion of carbon monoxide from motor vehicles
N79-27587
Stability sensitivity of the climatological dispersion model: A practical examination --- using emission data from an industrial plant
N79-27588
Numerical simulations of coastal-zone boundary layer ventilation and pollution transport
N79-27591
Receptor grid selection in model evaluation studies to compensate for uncertainty in wind direction specification
N79-27592
Meteorological input data for the Vienna dispersion model
N79-27593
Validation of the SO2 emission inventory for the Milan district area [50 X 60 km]
N79-27595
Status of NO sub x control for coal-fired power plants
N79-27609
Economic comparison of fabric filters and electrostatic precipitators for particulate control on coal-fired utility boilers
N79-27610
The synthesis of organic reagents for the trace analysis of air pollutants
N79-27714
Exhaust emissions characteristics of 5 aircraft piston engines [AD-A069012] N79-27719
Estimating air pollution frequency distributions [KNMI-WR-78-16] N79-27728
Electrochemical apparatus for analyzing carbon monoxide, hydrogen sulfide, hydrogen and sulfur dioxide [BMFT-FB-T-78-08] N79-27729
A comparison of surface diffusion of air pollutants over water and land [an artificial island in the North Sea] [KNMI-WR-78-13] N79-27790

AIR QUALITY
Proceedings of the Ninth International Technical Meeting on Air Pollution Modeling and its Application [REPT-103] N79-27543
Development and validation of a three-dimensional wind model for air quality analysis in complex terrain
N79-27551
A climatology of meteorological parameters for short-range dispersion and long-range transport
N79-27577
Compilation and analysis of data sets for the evaluation of regional sulfate models
N79-27579
The design of air quality networks
N79-27580
Validation of CRSTER model air quality estimates for an industrial plant
N79-27583
Tests of the climatological dispersion model and Gaussian Models at the Strait of Canso and at Lingan, Nova Scotia
N79-27584
Sensitivity of a Gaussian plume model to the vertical dispersion parameters
N79-27585
A consideration of measures and standards of performance of air quality simulation models
N79-27589
Air monitoring network design for power plant siting
N79-27590
On a calendar-time oriented systematic sampling plan in air quality monitoring
N79-27594
Air quality as a constraint to the use of coal in California
N79-27605
Energy-related air quality monitoring in the western energy resource development area [PB-293160/8] N79-27730

AIR SAMPLING
On a calendar-time oriented systematic sampling plan in air quality monitoring
N79-27594
International operations handbook for measurement of background atmospheric pollution [WMO-491] N79-27724
Meteorological and operational aspects of 46 clear air turbulent sampling missions with an instrumented B-57B aircraft. Volume 2, appendix C: Turbulence missions [NASA-TM-80045] N79-27772

AIR TO AIR MISSILES
New methods in the terminal guidance and control of tactical missiles
N79-27228

AIR TRAFFIC CONTROL
Definition, description, and interfaces of the FAA's developmental programs. Volume I: Overview [AD-A068226] N79-27117
Definition, description, and interfaces of the FAA's developmental programs. Volume 2: ATC facilities and interfaces [AD-A068401] N79-27118
Discrete Address Beacon System [DABS] Air Traffic Control Radar Beacon System [ATCRBS] interference analysis [AD-A068565] N79-27119

AIR TRANSPORTATION
Civil Aeronautics Board reports to Congress, fiscal year 1977 and transitional quarter
N79-27069
Aircraft and avionic related research required to develop an effective high-speed runway exit system [NASA-CR-159075] N79-27185

AIR WATER INTERACTIONS
Behavior of the thermal skin of cooling pond waters subjected to moderate wind speeds [CONF-781213-3] N79-27722

AIRBORNE EQUIPMENT
Application of color-coding in airborne tactical displays [AD-A067558] N79-27137
Remote sensing of hydrocarbon pollution
N79-27725

AIRCRAFT ANTENNAS
Microstrip antenna elements for use in hemispherically scanned arrays [AD-A068566] N79-27366

AIRCRAFT CONFIGURATIONS
Technology requirements and readiness for very large vehicles
[NASA-TM-80127] N79-27086
Summary of results for a twin-engine, low-wing airplane substructure crash impact condition analyzed with program KRASH
[AD-A069171] N79-27116
AIRCRAFT CONSTRUCTION MATERIALS
Flight service evaluation of Kevlar-49 epoxy composite panels in wide-bodied commercial transport aircraft
[NASA-CR-159071] N79-27246
AIRCRAFT CONTROL
State of the art survey of technologies applicable to NASA's aeronautics, avionics and controls program
[NASA-CR-159050] N79-27087
AIRCRAFT DESIGN
Experimental investigation into the feasibility of an extruded wing
N79-27077
The ultralight sailplane
N79-27080
Sixty years of aeronautical research, 1917-1977 --- Langley Research Center
[NASA-EP-145] N79-27089
Weapon/aircraft interactions
N79-27205
AIRCRAFT ENGINES
Energy efficient aircraft engines
[NASA-TM-79204] N79-27141
Stresses, vibrations, structural integration and engine integrity [including aeroelasticity and flutter]
[AGARD-CP-248] N79-27148
The analysis of engine vibrations
N79-27150
Aircraft engine design using experimental stress analysis techniques
N79-27151
Engine/aircraft structural integration: An overview
N79-27167
The integrity of aircraft jet engines under the impact of foreign bodies
N79-27174
Axial compressor stall --- effects on aircraft engines
N79-27435
Exhaust emissions characteristics of 5 aircraft piston engines
[AD-A069012] N79-27719
AIRCRAFT FUELS
Compatibility of elastomers in alternate jet fuels
[NASA-CR-158773] N79-27321
Findings and views concerning the exemption of aviation gasoline from the mandatory petroleum allocation and price regulations
[DOE/ERA-0024] N79-27336
Enthalpy of combustion of RJ-6
[AD-A067968] N79-28037
AIRCRAFT GUIDANCE
Study of the theoretical to real correspondance of an optimal control model and the significance of this model for the description of working methodology with partly automated aircraft guidance and control systems
[ILR-35] N79-27184
AIRCRAFT HYDRAULIC SYSTEMS
Aircraft hydraulic systems dynamic analysis
[AD-A067549] N79-27129
AIRCRAFT LANDING
Effects of control system dynamics on fighter approach and landing longitudinal flying qualities, volume 1
[AD-A067550] N79-27183
Computation of minimum noise aircraft landing trajectories
[NASA-CR-158931] N79-27929
AIRCRAFT MAINTENANCE
RAM projections for aircraft rotor blades
[AD-A068822] N79-27130
Small turbine engine integration in aircraft installations
N79-27170
AIRCRAFT NOISE
Aeronautical research into vertical problems in V/STOL aircraft approach landing
[IFD-4-78] N79-27134
AIRCRAFT PERFORMANCE
Engine performance considerations for the large subsonic transport
N79-27139
AIRCRAFT RELIABILITY
Review of airworthiness standards for certification of helicopters for Instrument Flight Rules [IFR] operation
[AD-A068397] N79-27127
AIRCRAFT SPECIFICATIONS
The requirement of damage tolerance. An analysis of damage tolerance requirements with specific reference to MIL-A-83444
[NLR-TR-77005-U] N79-27135
AIRCRAFT STRUCTURES
Correlation of predicted and measured thermal stresses on an advanced aircraft structure with dissimilar materials --- hypersonic heating simulation
[NASA-TM-72865] N79-27088
AIRCRAFT WAKES
The development of methods for predicting and measuring distribution patterns of aerial sprays
[NASA-CR-158787] N79-27092
AIRFOILS
An exploratory investigation of the effect of a plastic coating on the profile drag of a practical-metal-construction sailplane airfoil
[NASA-TM-80092] N79-27098
Leading-edge slat optimization for maximum airfoil lift
[NASA-TM-78566] N79-27100
Supersonic unstalled flutter
N79-27181
AIRFRAME MATERIALS
Correlation of predicted and measured thermal stresses on an advanced aircraft structure with dissimilar materials --- hypersonic heating simulation
[NASA-TM-72865] N79-27088
AIRFRAMES
Integration of an airframe with a turbofan and afterburner system
N79-27172
Effects of geometric variables on stress intensity factors for crack gages
[AD-A068631] N79-27533
AIRGLOW
Comments on the paper entitled the quenching of OH' in the atmosphere by Llewellyn, Long and Solheim
[INPE-1484-RPE/030] N79-27745
AIRLINE OPERATIONS
Civil Aeronautics Board reports to Congress, fiscal year 1977 and transitional quarter
N79-27069
Airfreight forecasting methodology and results
N79-27114
The 1990 direct support infrastructure
N79-27115
AIRPORTS
Definition, description, and interfaces of the FAA's developmental programs. Volume 2: ATC facilities and interfaces
[AD-A068401] N79-27118
AIRSPEED
Science and Technology of Low Speed and Motorless Flight. Third International Symposium
[NASA-CR-2085] N79-27070
A Monte Carlo approach to competition strategy --- for maximum lift and airspeed
N79-27075
ALBUMINS
Investigation of albumin and globulin composition of blood of the crew of the Salyut-3 orbital station
N79-27820
ALCOHOLS
Alcohol fuels
[GPO-22-334] N79-27322
ALDEHYDES
Mechanistic studies in the organic solid state
N79-28008
ALFALFA
Relationship of red and photographic infrared spectral radiances to alfalfa biomass, forage water content, percentage canopy cover, and severity of drought stress
[NASA-TM-80272] N79-27638
ALGAE
Algal growth kinetics in bioconversion of solar energy
N79-27650
ALGEBRA
An algebraic expression for first-order reaction in laminar flow
N79-27470
Vincent's theorem in algebraic manipulation
N79-27890
ALGORITHMS
Evaluation of registration, compression and classification algorithms. Volume 1: Results
[NASA-TM-78227-VOL-1] N79-27630
Evaluation of registration, compression and classification algorithms. Volume 2: Documentation
[NASA-TM-78227-VOL-2] N79-27631
On the complexity of multivariable query evaluation
[FOA-C-20292-D8] N79-27913
ALKALI METAL COMPOUNDS
Oxy anion-accelerated rearrangements
N79-27260
ALKALI METALS
Measurements of differential cross sections for electronic excitations on Na-Hg K-Hg, and Cs-Hg systems
[MPIS-13/1978] N79-27952
ALKALINE BATTERIES
Theoretical and experimental analysis of alkaline zinc batteries
[AD-A067514] N79-27666
ALPS MOUNTAINS [EUROPE]
The catalogue of objective statistical weather forecasts for the northern Alps, the Valais, and northern and central Grisons
[SZ-ISSN-0080-7346] N79-27771
ALTERNATING CURRENT
Three-phase UHV ac transmission research
[EPRI-EL-823] N79-27411
ALTITUDE CONTROL
Handbook on astronaut crew motion disturbances for control system design --- in skylab
[NASA-RP-1025] N79-27237
ALTITUDE TESTS
Turbine engine altitude chamber and flight testing with liquid hydrogen
[NASA-TM-79196] N79-27140
ALUMINUM ALLOYS
Adhesive material transfer in the erosion of an aluminum alloy
[NASA-TM-79165] N79-27306
Material science and solid state physics studies with positive muon spin precession --- fe[al] alloys
[NASA-CR-158786] N79-28025
ALUMINUM COMPOUNDS
Measurement of transport properties of several N-alkylpyridinium halides and their mixtures with aluminum chloride
[AD-A067763] N79-27280
ALUMINUM OXIDES
Low temperature, glass-like properties of crystalline beta-alumina
[COO-1198-1233] N79-27294
Surface flashover characteristics of alumina dielectric guide cathodes in an intense relativistic electron beam accelerator
N79-27955
Dissolution processes of aluminum oxide on tungsten, iridium, molybdenum, tantalum, and rhenium as a function of electric field strength
N79-28013
AMIDES
Electrochemical fluorination of trichloroethylene and N, N-dimethyltrifluoroacetamide
[NASA-TM-79188] N79-27242
AMINES
High performance N2O4/amine elements blowapart
[NASA-CR-160272] N79-27323
High performance N2O4/amine elements blowapart
[NASA-CR-160273] N79-27324
AMORPHOUS MATERIALS
Transitions above the glass transition temperature in amorphous polymers
N79-27299
AMPLITUDE DISTRIBUTION ANALYSIS
High energy behavior of pion-nucleon-scattering partial waves from amplitude analysis
[REPT-78] N79-27969
ANALOG TO DIGITAL CONVERTERS
Codification and decodification of the pulse amplitude originating from space radiation
[INPE-1430-NTE/146] N79-28117
ANALYSIS (MATHEMATICS)
Theoretical and experimental analysis of alkaline zinc batteries
[AD-A067514] N79-27666
Gauge field theories. Part 3: Renormalization
[COO-1545-245-PT-3] N79-27905
A survey of some recent mathematical results in atomic and molecular quantum mechanics
N79-27938
ANALYTIC FUNCTIONS
On pointwise and analytic similarity of matrices
[AD-A068866] N79-27925
ANECHOIC CHAMBERS
Analysis, design, and test of acoustic treatment in a laboratory inlet duct
[NASA-CR-3161] N79-27934
ANELASTICITY
Wave propagation in anelastic media with applications to seismology
N79-27734
ANEMOMETERS
The 19702A GSRS missle number 10, round number, B-1, 6 February 1979
[AD-A067676] N79-27777
ANGLE OF ATTACK
High incidence aerodynamics
N79-27210
ANGULAR ACCELERATION
Balance training of the equilibrium organ and its effect on flight strategy
N79-27074
ANISOTROPIC MEDIA
Energy transfer in anisotropic systems. A: Exciton migration in substitutionally disordered one-dimensional solids. B: The spectroscopy of molecules adsorbed on metal surfaces
N79-28010
ANISOTROPY
In depth study of the magnetocrystalline anisotropy of polycrystalline ferrimagnetic oxides
[LCR-1437/77] N79-28032
ANNEALING
Effect of thermal annealing in boron implanted, laser annealed silicon
[CONF-781167-5] N79-27250
ANNIHILATION REACTIONS
Transverse momentum distributions in Drell-Yan processes
[ILL-(TH)-79-22] N79-27897

ANNUAL VARIATIONS
Relationship between sunspot numbers during years of sunspot maximum and sunspot minimum
[INPR-1485-RPE/031] N79-28108

ANTARCTIC REGIONS
The 911 years of microparticle deposition at the South Pole: A climatic interpretation
N79-27732

ANTENNA ARRAYS
Application of a correlation discriminant operator to perturbational adaptive algorithms
[AD-A068890] N79-27362
Microstrip antenna elements for use in hemispherically scanned arrays
[AD-A068566] N79-27366

ANTENNA DESIGN
Multiple band circularly polarized antenna
[NASA-CASE-MSC-18334-1] N79-27348

ANTENNA RADIATION PATTERNS
Analysis of arbitrarily shaped wire antennas radiating over a lossy half-space
[AD-A068548] N79-27365

ANTENNAS
Analysis of arbitrarily shaped wire antennas radiating over a lossy half-space
[AD-A068548] N79-27365
Pershing 2 alternate altimeter replacement scheme
[AD-A068168] N79-27483

APOLLO PROJECT
What's new on the moon?
[NASA-EP-131] N79-28096

APOLLO TELESCOPE MOUNT
Apollo telescope mount: A partial listing of scientific publications and presentations, supplement 3
[NASA-TM-78303] N79-27500

APPLICATIONS PROGRAMS (COMPUTERS)
New instrumental, mathematical, and chemical developments for kinetic methods of analysis
N79-27267
Extension, validation and application of the NASCAP code
[NASA-CR-159595] N79-27397
Computer controlled ESR
[AD-A068164] N79-27868
Separably-infinite programs
[AD-A068923] N79-27882

APPROACH
Effects of control system dynamics on fighter approach and landing longitudinal flying qualities, volume I
[AD-A067550] N79-27183

APPROPRIATIONS
Department of Housing and Urban Development, independent agencies appropriation bill, 1980 --- congressional reports
[S-REPT-96-258] N79-28057

APPROXIMATION
On rational approximations of groups of operators
[CTH-MATH-1978-10-1] N79-27911
Critical behavior of the n-vector and charged n-vector models from an exact solution to the screening approximation
N79-28016

AQUEOUS SOLUTIONS
Thermodynamic analysis of equilibrium phase relations among minerals and aqueous solutions in metasomatic processes
N79-28033

AQUIFERS
A study of the theoretical and practical determination of hydrogeological parameters in glacial outwash sands by surface geoelectrics
N79-27733
The digital simulation of areal salt transport to evaluate water management proposals in a coastal aquifer
N79-27803

ARC DISCHARGES
High pressure arcs in SF6. Part 1: Formation and velocity distribution of vapor jets at the electrodes
[BMFT-FB-T-78-03-PT-1] N79-27419
High pressure arcs in SF6. Part 2: Energy transport by radiation
[BMFT-FB-T-78-04-PT-2] N79-27420
High pressure arcs in SF6. Part 3: Influence of magnetic fields on circuit breaker arcs
[BMFT-FB-T-78-05-PT-3] N79-27421
High pressure arcs in SF6. Part 4: Field strength measurements in blown SF6-arcs
[BMT-FB-T-78-06-PT-4] N79-27422

ARCHAEOLOGY
The third millenium roots of Babylonian mathematics. Part 1: A method for the decipherment, through mathematical and metrological analysis, of Proto-Sumerian and Proto-Elamite semi-pictograph inscriptions
[CTH-MATH-1978-9] N79-27910

ARCHITECTURE (COMPUTERS)
Massively parallel processor computer
[NASA-CASE-GSC-12223-1] N79-27864
Fault tolerant spaceborne computer study. Preprocessor design
[AD-A067693] N79-27866
Brassboard Fault Tolerant Spaceborne Computer (BFTSC), volume I
[AD-A068553] N79-27869
Meta assembler enhancements and generalized linkage editor
[NASA-CR-161255] N79-27872

AREA
Apparatus for rapid and precise surface area measurements of unconsolidated geologic materials
[BETC/RI-78/8] N79-27756

ARID LANDS
Investigation of near surface aerosol properties in arid regions
[AD-A068554] N79-27753

ARITHMETIC AND LOGIC UNITS
Arithmetic codes
[AD-A067579] N79-27899

AROMATIC COMPOUNDS
Photosensitized cationic polymerization
N79-27302

ARRAYS
A 10-kilowatt photovoltaic concentrator array
[SAND-78-7024] N79-27699

ARROW WINGS
Influence of optimized leading-edge deflection and geometric anhedral on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- langley 7 by 10 foot tunnel
[NASA-TM-80083] N79-27095

ARTERIES
Heat pipes with headers and single and two phase artery systems
[NEL-656] N79-27473
Mechanics of arterial blood flow
N79-27846
Mass transport in arteries
N79-27848

ARTIFICIAL INTELLIGENCE
Automatic discovery of heuristics for non-deterministic programs
[AD-A067546] N79-27876
A framework for artificial intelligence
[AD-A068188] N79-27886
Planning nets: A representation for formalizing analogies and semantic models of procedural skills
[AD-A067907] N79-28050

ASBESTOS
Effect of silicate ions on electrode overvoltage
[P/539/77/24] N79-27413

ASPHALT
Kinetics of coal liquefaction to preasphaltenes, asphaltenes and oils
N79-27320

ASSEMBLIES
On the calculation of yield strength for various assemblies
[CETIM-1-1G-06-0] N79-27541

ASSEMBLY LANGUAGE
Meta assembler enhancements and generalized linkage editor
[NASA-CR-161255] N79-27872

ASSESSMENTS
Citizens' solar program: State reports on barriers and strategies to renewable energy development
[HCP/U6308-01] N79-27703

ASTEROIDS
Radio observations of asteroids: Results and prospects
[NASA-CR-158781] N79-28075

ASTRO VEHICLE
Flight test of four ESTEC heat pipes as a part of the payload planner for launch on an ARIES rocket
[ESA-CR[P]-1146] N79-27222

ASTROMETRY
Simultaneous determination of the components xi and eta of the deviation from the vertical with an astrolab prism: Part Vb: Observations at 48deg latitude during 1972
[SER-B-199-MITT-143] N79-28079

ASTRONOMICAL CATALOGS
Catalogue of 'strict 0.01 mag photometric star boxes'
[PUBL-SER-B-FASC-2] N79-28081
On the simultaneous determination of the components xi eta of the deviation of the vertical using an astrolab prism
[SER-B-222-MITT-146] N79-28085

ASTRONOMICAL COORDINATES
Tropospheric limitations on the accuracy of phase measurement of coordinates in astronomy
[NASA-TM-75480] N79-28073
On the simultaneous determination of the components xi eta of the deviation of the vertical using an astrolab prism
[SER-B-222-MITT-146] N79-28085

ASTRONOMICAL MODELS
Laboratory analogues to cosmic dust
N79-27275
Kinetic versus hydrodynamic solar wind models
[AERONOMICA-ACTA-A-196-1978] N79-28107

ASTRONOMICAL OBSERVATORIES
European sponsored astronomical research activities
[AR-1977] N79-28080
Astronomical activities in the period October 1, 1976 to September 30, 1977
N79-28084

ASTRONOMICAL PHOTOMETRY
Rapid photometry of cataclysmic variable stars
N79-28069
Photometry of a complete sample of faint galaxies
N79-28071

ASTRONOMICAL SPECTROSCOPY
Construction and setting up of a lamellar grating with a very wide spectral range and its use as a Fourier spectrometer for astrophysical measurements on large molecules
[MPI-PAE/EXTRATERR-144] N79-27949

ASTRONOMY
Astronomical activities in the period October 1, 1976 to September 30, 1977
N79-28084

ASTROPHYSICS
Topics in astrophysical X-ray and gamma ray spectroscopy
N79-28067

ATLANTIC OCEAN
Continental margin atmospheric climatology and sea level 1974-1975
[PB-293734/0] N79-27799

ATLAS LAUNCH VEHICLES
Atlas 5013 tank corrosion test
[NASA-CR-158760] N79-27234

ATMOSPHERIC BOUNDARY LAYER
Numerical simulations of coastal-zone boundary layer ventilation and pollution transport
N79-27591
A detailed parameterization of the atmospheric boundary layer
N79-27731
Characteristics of turbulence in the atmospheric boundary layer
[FOA-VOL-12-NO-2] N79-27793

ATMOSPHERIC CHEMISTRY
Relationship between pH value and electrolyte composition of precipitation
[ANL-TRANS-1149] N79-27721

ATMOSPHERIC CIRCULATION
Tests of the climatological dispersion model and Gaussian Models at the Strait of Canso and at Lingan, Nova Scotia
N79-27584
Documentation of a ground hydrology parameterization for use in the GISS atmospheric general circulation model
[NASA-CR-158766] N79-27632
Analysis of the potential of wind energy conversion systems
[SAND-78-2099C] N79-27668

ATMOSPHERIC COMPOSITION
The application of a mathematical model to the estimation of the concentrations of pollutants in European cities
N79-27586
Air monitoring network design for power plant siting
N79-27590
International operations handbook for measurement of background atmospheric pollution
[WMO-491] N79-27724

ATMOSPHERIC DIFFUSION
Physical modeling of plume dispersion in complex terrain: Neutral and stable atmosphere
N79-27544
Valley circulation influence on tall stack dispersion from a ridge location
N79-27545
Dispersion from chimneys downwind of cubical buildings: A wind-tunnel study
N79-27547
Modelling the effect of separated wakes behind hills and buildings on pollutant dispersion
N79-27549
Parameterizing atmospheric diffusion
N79-27553
Theoretical background for the choice of stability parameters --- for modeling air pollution diffusion
N79-27554
Influence of the turbulence typing scheme upon the yearly average concentrations by means of a bi-Gaussian model
N79-27555
Critical review of dispersion coefficients measured and applied in the Federal Republic of Germany
N79-27556
A comparative study of diffusion classification by lapse rate, gustiness and a modified Pasquill method
N79-27557
Use of wind fluctuation statistics to estimate dispersion near roadways
N79-27558
Results of SF6 tracer diffusion experiments next to a power plant
N79-27565
Sensitivity of a Gaussian plume model to the vertical dispersion parameters
N79-27585

ATMOSPHERIC ELECTRICITY
The application of atmospheric electricity concepts and methods to other parts of meteorology
(WMO-507) N79-27792
ATMOSPHERIC MODELS
Proceedings of the Ninth International Technical Meeting on Air Pollution Modeling and its Application
(REPT-103) N79-27543
Physical modeling of plume dispersion in complex terrain: Neutral and stable atmosphere
N79-27544
Valley circulation influence on tall stack dispersion from a ridge location
N79-27545
Modelling the effect of separated wakes behind hills and buildings on pollutant dispersion
N79-27549
A numerical model of flow above gentle topography with changes in surface roughness
N79-27550
Development and validation of a three-dimensional wind model for air quality analysis in complex terrain
N79-27551
Parameterizing atmospheric diffusion
N79-27553
Theoretical background for the choice of stability parameters --- for modeling air pollution diffusion
N79-27554
Influence of the turbulence typing scheme upon the yearly average concentrations by means of a bi-Gaussian model
N79-27555
A comparative study of diffusion classification by lapse rate, gustiness and a modified Pasquill method
N79-27557
Use of wind fluctuation statistics to estimate dispersion near roadways
N79-27558
Stack plume characterization and model assessment with lidar data
N79-27562
Short-term dispersion from tall stacks
N79-27567
An improved version of the reactive plume model (RPM-II)
N79-27568
Point source air pollution modeling
N79-27574
Regional transport and photochemical model of atmospheric sulfates
N79-27575
The European regional model of air pollution (EURMAP) and its application to short term episodes
N79-27576
A multi-scale dispersion model for local and regional sulfur dioxide/sulfate concentrations: Formulation and initial evaluation
N79-27578
Compilation and analysis of data sets for the evaluation of regional sulfate models
N79-27579
The design of air quality networks
N79-27580
Stability sensitivity of the climatological dispersion model: A practical examination --- using emission data from an industrial plant
N79-27588
Solar radiation absorption studies in the atmosphere and ocean using a two stream method
(MITT-25) N79-27620
Documentation of a ground hydrology parameterization for use in the GISS atmospheric general circulation model
(NASA-CR-158766) N79-27632
A computer program for calculating infrared fluxes
(KNMI-WR-78-15) N79-27766
Wind trajectory models
(KNMI-WR-78-6) N79-27787
On the calculation of large scale vertical circulation using a three parameter quasigeostrophic numerical model
(KNMI-WR-78-12) N79-27789
ATMOSPHERIC MOISTURE
Numerical simulation of VTPR temperature retrievals in a severe storm environment
(NASA-CR-158761) N79-27770
ATMOSPHERIC PHYSICS
An experimental system to measure atmospheric extinction of visible, near and far infrared radiation in the marine boundary layer
(AD-A067557) N79-27751
Investigation of near surface aerosol properties in arid regions
(AD-A068554) N79-27753
ATMOSPHERIC PRESSURE
Continental margin atmospheric climatology and sea level 1974-1975
(PB-293734/0) N79-27799
ATMOSPHERIC RADIATION
Study on the ultraviolet radiation of the atmosphere of Venus --- venera 11 and 12 observations
N79-28098
ATMOSPHERIC SCATTERING
Regional transport and photochemical model of atmospheric sulfates
N79-27575
ATMOSPHERIC TEMPERATURE
Vertical changes in stability conditions within the first 100 meters: Tennessee Valley
N79-27596
Numerical simulation of VTPR temperature retrievals in a severe storm environment
(NASA-CR-158761) N79-27770
Average winter temperatures at De Bilt (the Netherlands): 1634 - 1977
(KNMI-V-305) N79-27796
Optimum interpolation of radiosonde and satellite-derived temperature fields
(PB-293017/0) N79-27798
ATMOSPHERIC TIDES
Solar and lunar daily variation at low latitudes during quiet and disturbed days
(INPE-1435-RPE/011) N79-28088
ATMOSPHERIC TURBULENCE
The transfer of electromagnetic radiation in the turbulent atmosphere
N79-27389
Meteorological and operational aspects of 46 clear air turbulent sampling missions with an instrumented B-57B aircraft. Volume 2, appendix C: Turbulence missions
(NASA-TM-80045) N79-27772
Relation of Richardson number to the curvature of the wind profile
(INPR-1486-RPE/032) N79-27775
Characteristics of turbulence in the atmospheric boundary layer
(FOA-VOL-12-NO-2) N79-27793
ATOMIC COLLISIONS
Exchange perturbation theories applied to electron-hydrogen atom scattering
N79-27942
ATOMIC ENERGY LEVELS
Search for low-lying triplet electronic states
(AD-A068465) N79-28028
ATOMIC EXCITATIONS
Measurements of differential cross sections for electronic excitations on Na-Hg K-Hg, and Cs-Hg systems
(MPIS-13/1978) N79-27952
ATOMIC PHYSICS
The nuclear and atomic physics governing changes in the composition of relativistic cosmic rays
N79-28112
ATOMIC THEORY
A survey of some recent mathematical results in atomic and molecular quantum mechanics
N79-27938
ATOMS
A systematic determination of extended atomic orbital basic sets and application to molecular SCF and MCSCF calculations
N79-27941
ATTENUATION
Insolation measurements in and near an industrial region of the Netherlands
(KNMI-WR-78-14) N79-27727
Measurement of optical fibers attenuation by the reflectometric method: Experimental apparatus and attainable accuracy
(FUB-16-1977) N79-27985
A low temperature ultrasonic study of hydrogen in niobium
N79-28019
ATTENUATION COEFFICIENTS
Computation of attenuation and phase shift per unit length due to spherical rain drops
(FUB-24-1977) N79-27375
Calculation of the attenuation as a function of rainfall intensity for several polarizations
(FUB-43-1977) N79-27382
Measurements of characteristic parameters of an optical fiber
(FUB-22-1977) N79-27987
AUDIO EQUIPMENT
Magnitude estimation as a hearing aid selection procedure
N79-27838
AUDIO FREQUENCIES
A voltage controlled active low pass filter
(RSRE-78013) N79-27417
AUDITORY PERCEPTION
The loudness of tinnitus
N79-27837
AUGER SPECTROSCOPY
Auger spectroscopy analysis of lubrication with zinc dialkyldithiophosphate of several metal combinations in sliding contact
(NASA-TP-1489) N79-27308
AUSTRALIA
Application of the unit regional value concept to a study of the mineral resources of Australia
N79-27624
AUSTRIA
Meteorological input data for the Vienna dispersion model
N79-27593
Space activity in Austria, 1976/77
N79-28060
AUTOCORRELATION
Spectral analysis using the Karhunen-Loeve transform
(REPT-7-78) N79-27922
AUTOIONIZATION
The calculation of autoionization positions and widths with applications to penning ionization reactions
N79-27254
AUTOMATIC CONTROL
Microbial load monitor
(NASA-CR-160274) N79-27815
The systemic principles of building a man-machine control staff --- functional analysis
N79-27861
AUTOMATIC FLIGHT CONTROL
Study of the theoretical to real correspondance of an optimal control model and the significance of this model for the description of working methodology with partly automated aircraft guidance and control systems
(ILR-35) N79-27184
AUTOMATIC TEST EQUIPMENT
Automatic flowmeter calibration system
(NASA-CASE-KSC-11076-1) N79-27479
AUTOMOBILE FUELS
The 1980 motor gasoline supply and demand. Analysis memorandum AM/ES/79-12
(DOE/EIA-0102/32) N79-27337
AUTOMOBILES
Prospects for heavy/medium duty automotive stirling engines
N79-27505
AUTOREGRESSIVE PROCESSES
Estimation of the parameters of an autoregressive process in the presence of additive white noise
(AD-A068749) N79-27363
AVIONICS
State of the art survey of technologies applicable to NASA's aeronautics, avionics and controls program
(NASA-CR-159050) N79-27087
Aircraft fiber-optic interconnect systems project
(AD-A068366) N79-27978
AXIAL FLOW
Unsteady Flows in Axial Flow Compressors
(VKI-LECTURE-SERIES-20) N79-27429
The functioning of axial compressors without adaptation. The uncoupling boundary and revolving separation
N79-27434

B

BACKGROUND NOISE
The transfer function and Brownian noise of the gravitational antenna
(LPS-78-1) N79-27380
BACKGROUND RADIATION
Background radiation in some recent high-resolution measurements in gamma-ray astronomy
(INPE-1474-RPE/025) N79-28076
BACKSCATTERING
Platteville heating results: HF radar observations
(AD-A068163) N79-27361
BALANCE
Balance training of the equilibrium organ and its effect on flight strategy
N79-27074
Determining the dynamic response due to an imbalance at the attachments of a motor on a pod --- caused by rotor blade loss
N79-27171
BALLISTIC MISSILE EARLY WARNING SYSTEM
Guidance Simulation Techniques
N79-27229
BALLISTIC MISSILES
The 12824C lance, missile number 4661, round number 324 NPL
(AD-A067761) N79-27778
BALLISTICS
The 19702A GSRS missle number 10, round number, B-1, 6 February 1979
(AD-A067676) N79-27777
The 19303 GSRS. Missile number 1013, round number V-13,
(AD-A067686) N79-27780
BALLOON FLIGHT
Zero and superpressure free flight ballooning
(AWRE-0-61/78) N79-27111
BALLOON SOUNDING
Balloon borne ultraviolet spectrometer
(AD-A067688) N79-27482
Investigation of near surface aerosol properties in arid regions
(AD-A068554) N79-27753
BALLOON-BORNE INSTRUMENTS
Background radiation in some recent high-resolution measurements in gamma-ray astronomy
(INPE-1474-RPE/025) N79-28076

BANDPASS FILTERS
Computation of the irregularity factor N sub 0/N sub 1 of a stationary Gaussian process with dual peak power spectral density
[LBF-TB-137] N79-27919
BARYONS
Globally baryon symmetric cosmology, GUT spontaneous symmetry breaking, and the structure of the universe
[NASA-TM-80306] N79-28090
Cosmological baryon number domain structure from symmetry-breaking in grand unified field theories
[NASA-TM-80281] N79-28091
BASALT
Mars section of remote sensing of basalts in the solar system. Chapter 2 of basaltic volcanism in the solar system
[RSL-221] N79-28097
Thickness of western mare basalts
[NASA-CR-158784] N79-28101
BASE PRESSURE
Base drag
N79-27209
BATCH PROCESSING
Evaluation of the flash desulfurization process for coal cleaning
[PB-292328/2] N79-27342
BATHYMETERS
The Sea-Beam: A multi-beam echo-sounder installed on the oceanographic ship 'Jean Charcot'
[CNEXO-STR-37] N79-27810
BATHYTHERMOGRAPHS
Expendable bathythermograph observations from NMFS/MARAD Ship of Opportunity program for 1975
[PB-294215/9] N79-27811
BAYES THEOREM
Bayesian software prediction models. Volume 5: Summary of technical progress
[AD-A067690] N79-27877
Computer programs for scoring test data with item characteristic curve models
[AD-A067752] N79-27878
BEAM SWITCHING
A central multichannel coupler for connections between fiber optic bundles
[LCR-14077] N79-27369
BETA PARTICLES
Low temperature, glass-like properties of crystalline beta-alumina
[COO-1198-1233] N79-27294
High beta plasmas in toroidal Surmacs
N79-27991
BIBLIOGRAPHIES
Aeronautical Engineering: A continuing bibliography with indexes, supplement 110
[NASA-SP-7037[110]] N79-27068
IEA biomass information service. Current awareness bulletin, May - June 1978 --- bibliographies
[NP-23641] N79-27334
Apollo telescope mount: A partial listing of scientific publications and presentations, supplement 3
[NASA-TM-78303] N79-27500
Energy: A continuing bibliography with indexes, issue 21
[NASA-SP-7043[21]] N79-27647
Solar energy for agricultural and industrial process heat
[DOE/CS-0053] N79-27688
SBIBLI: A data base system for bibliographic references
[FFM-264] N79-28052
BIG BANG COSMOLOGY
On the origin of the elements: A brief review
[INPE-1466-RPE/019] N79-28087
Cosmological baryon number domain structure from symmetry-breaking in grand unified field theories
[NASA-TM-80281] N79-28091
BINARY MIXTURES
Vapor liquid equilibria for the systems water-methanol, waterethanol, methanol-ethanol, and water-methanol-ethanol at 298.15 K determined by a rapid transpiration method
[NPL-CHEM-95] N79-27290
BIODEGRADABILITY
The synthesis of some biodegradable polymers
N79-27300
BIODYNAMICS
Effects of vibration on the human organism
N79-27862
BIOGEOCHEMISTRY
A biogeochemical study of manganese in the estuarine zone
N79-27805
BIOINSTRUMENTATION
Magnitude estimation as a hearing aid selection procedure
N79-27838
BIOLOGICAL EFFECTS
Space biology and aerospace medicine, v. 13, no. 3, 1979
[JPRS-73784] N79-27817
Helium-oxygen mixture and the organism hyperbaric aspect
N79-27818
The combined effect of space flight factors and radiation on rat skeletal muscles
N79-27821
Immunological reactivity of rats flown aboard Cosmos-605 and Cosmos-690 biosatellites
N79-27824
Biological effects of laser irradiation on nerve cells
N79-27840
Translations on USSR science and technology: Biomedical and behavioral sciences, no. 81
[JPRS-73729] N79-27860
BIOMASS
Relationship of red and photographic infrared spectral radiances to alfalfa biomass, forage water content, percentage canopy cover, and severity of drought stress
[NASA-TM-80272] N79-27638
Effect of phosphorus supply on algal biomass in a turbid Missouri Reservoir
[PB-293183/0] N79-27816
BIOMASS ENERGY PRODUCTION
Investigation of gasification of biomass in the presence of catalysts
[CONF-7809125-1] N79-27327
Methane production from beef cattle feedlots
[CONF-7806107-2] N79-27333
IEA biomass information service. Current awareness bulletin, May - June 1978 --- bibliographies
[NP-23641] N79-27334
Comparative economic assessment of ethanol from biomass
[HCP/ET-2854] N79-27335
BIONICS
Refinement and validation of a mathematical model of the human torso
N79-27841
BIOPHYSICS
Mechanics of mammalian lung
N79-27844
BIPOLAR TRANSISTORS
Component modelling of microwave transistors
[REPT-72/78/91-ISSUE-2] N79-27415
BIRD-AIRCRAFT COLLISIONS
The integrity of aircraft jet engines under the impact of foreign bodies
N79-27174
BLACK BODY RADIATION
Evaluation of a self-calibrating silicon bolometer
[AD-A068083] N79-27484
BLAST LOADS
Response of a rocket motor to transverse blast loading
[AD-A068464] N79-27239
BLOOD
Investigation of albumin and globulin composition of blood of the crew of the Salyut-3 orbital station
N79-27820
BLOOD CIRCULATION
Effect of hyperbaric oxygen on peripheral blood neutrophil metabolism
N79-27830
Evaluation of circulatory reactions in the head to antiorthostatic position
N79-27832
Physiological fluid dynamics
[VKI-LECTURE-SERIES-32] N79-27843
Mechanics of arterial blood flow
N79-27846
Mechanics of the microcirculation
N79-27847
Pulmonary circulation and microcirculation
N79-27849
Techniques of measurement
N79-27850
BLOOD FLOW
Physiological fluid dynamics
[VKI-LECTURE-SERIES-32] N79-27843
Mechanics of arterial blood flow
N79-27846
Mechanics of the microcirculation
N79-27847
Techniques of measurement
N79-27850
BODY FLUIDS
Simulation of fluid-electrolyte metabolism as a means of preventing orthostatic instability in the crew of the second expedition aboard the Salyut-4 station
N79-27819
Physiological fluid dynamics
[VKI-LECTURE-SERIES-32] N79-27843
Techniques of measurement
N79-27850
BODY TEMPERATURE
The human micro-environment
N79-27851
BODY-WING AND TAIL CONFIGURATIONS
The consideration of wing-body and wing-tail interference in missile-design
N79-27213
BODY-WING CONFIGURATIONS
Numerical evaluation of transonic equivalence rule
[AD-A067902] N79-27101
BOILERS
Economic comparison of fabric filters and electrostatic precipitators for particulate control on coal-fired utility boilers
N79-27610
Economic considerations in coverting from oil/gas firing to coal
N79-27611
BOLOMETERS
Evaluation of a self-calibrating silicon bolometer
[AD-A068083] N79-27484
A bolometer for 0.3 Kelvin
[MPI-PAE/EXTRATERR-143] N79-27486
BOLTS
On the calculation of yield strength for various assemblies
[CETIM-1-1G-06-0] N79-27541
BOLTZMANN TRANSPORT EQUATION
Macroscopic transport equations --- plasmas origin in kinetic theory
[INPE-1471-RPE/022] N79-27997
BOMBS [ORDNANCE]
MK 82 bomb ejection sensitivity test report
[AD-A068583] N79-27132
BONDING
Fracture mechanisms in fibrous composites --- glass and carbon fiber reinforced plastics
[AD-A067965] N79-27247
BORON
Effect of thermal annealing in boron implanted, laser annealed silicon
[CONF-781167-5] N79-27250
BOUNDARY LAYER CONTROL
Performance of a V/STOL tilt nacelle inlet with blowing boundary layer control
[NASA-TM-79176] N79-27093
BOUNDARY LAYER EQUATIONS
Derivation of the basic equations for non-equilibrium boundary layers
N79-27438
Reacting and interacting hypersonic boundary layers
N79-27439
The numerical solution of the nonsimilar laminar boundary-layer equations including the effects of nonequilibrium dissociation
N79-27440
Hypersonic boundary layers
N79-27441
Downstream laminar boundary layer with mass additions
N79-27442
Hypersonic turbulent boundary layers without mass addition
N79-27444
BOUNDARY LAYER FLOW
Reacting and interacting hypersonic boundary layers
N79-27439
Downstream laminar boundary layer with mass additions
N79-27442
BOUNDARY LAYER SEPARATION
The functioning of axial compressors without adaptation. The uncoupling boundary and revolving separation
N79-27434
BOUNDARY LAYER STABILITY
Experiments on the stability and transition of two-dimensional and three-dimensional boundary layers with suction
[NASA-CR-157256] N79-27464
Theoretical background for the choice of stability parameters --- for modeling air pollution diffusion
N79-27554
BOUNDARY LAYER TRANSITION
Boundary layer transition
N79-27443
Experiments on the stability and transition of two-dimensional and three-dimensional boundary layers with suction
[NASA-CR-157256] N79-27464
BOUNDARY LAYERS
The basic equations
N79-27277
An experimental system to measure atmospheric extinction of visible, near and far infrared radiation in the marine boundary layer
[AD-A067557] N79-27751
BOUNDARY VALUE PROBLEMS
The numerical solution of the nonsimilar laminar boundary-layer equations including the effects of nonequilibrium dissociation
N79-27440
Boundary layer transition
N79-27443
The solution of Navier-Stokes equations in the boundary layer
N79-27455
Recent developments in the numerical treatment of partial differential equations
N79-27457
The numerical solution of singular integral equations and applications to mixed boundary value problems of fracture mechanics
N79-27529

Analysis of finite element methods for second order boundary value problems using mesh dependent norms
[AD-A068902] N79-27903

BOW WAVES
Magnetic field studies at Jupiter by Voyager 1: Preliminary results
[NASA-TM-80288] N79-28104

BRAIN
Dose-effect relationships for ultrasound irradiation of brain tissue
N79-27812

BRAZIL
Remote sensoring of the southeast region of the state of Sao Paulo: A proposition of a methodology for the geological interpretation of SLAR images
[INPE-1461-NTE/148] N79-27356
Diurnal rainfall variability in northeast Brazil
[INPE-1487-RPE/033] N79-27774

BRIGHTNESS
The 10 February 1977 lunar occultation of Uranus. Radius, limb darkening, and polar brightening at 6900 A
[NASA-CR-158780] N79-28074

BRINES
Kinetics of silica deposition from simulated geothermal brines
[CONF-790108-1] N79-27691

BRITTLENESS
Acoustic emission sources in brittle solids --- conferences
[LBL-8335] N79-27937

BROADBAND AMPLIFIERS
Integrated high frequency circuits
[BMFT-FB-T-78-24] N79-27427

BROWNIAN MOVEMENTS
The transfer function and Brownian noise of the gravitational antenna
[LPS-78-1] N79-27380

BUBBLES
Condensation on a noncollapsing vapor bubble in a subcooled liquid
[NASA-TM-79212] N79-27461

BUCKLING
Response of structures to dynamic loading
[AD-A068567] N79-27534
The buckling of short tubes under external pressure
[OUEL-1258/78] N79-27542

BUDGETING
Department of Housing and Urban Development, independent agencies appropriation bill, 1980 --- congressional reports
[S-REPT-96-258] N79-28057

BUILDINGS
Description of the possibilities for energy savings during the design and construction of apertures in buildings [cross-section report]
[BMFT-FB-T-78-15] N79-27345
Modelling the effect of separated wakes behind hills and buildings on pollutant dispersion
N79-27549
Modeling passive solar buildings with hand calculations --- conferences
[LBL-8583] N79-27683
Solar Heating and Cooling Of Buildings [SHACOB] requirements definition and impact analysis
[EPRI-ER-808-VOL-1] N79-27687

BURSTS
Gamma-ray burst observations from Helios-2
[NASA-TM-80284] N79-28115

C

CALIBRATING
Diphenyl ether triple point cells
[NPL-CHEM-86] N79-27289
Automatic flowmeter calibration system
[NASA-CASE-KSC-11076-1] N79-27479
Evaluation of a self-calibrating silicon bolometer
[AD-A068083] N79-27484

CALIFORNIA
Proceedings of the Conference on Coal Use for California
[NASA-CR-158770] N79-27597
Using coal inside California for electric power
N79-27598
Using coal inside California for nonelectric applications
N79-27599
A systems examination of the opportunities of coal for California
N79-27600
Electric energy demand and supply prospects for California
N79-27601
Coal's role in California's energy needs
N79-27602
Energy supply and demand in California
N79-27603
Possible environmental effects of increased coal use in California
N79-27604
Air quality as a constraint to the use of coal in California
N79-27605
Water as a constraint to the use of coal for California
N79-27606
Coal supply for California
N79-27607
Prospects for coal slurry pipelines in California
N79-27608
A large scale wind energy program for the state of California
N79-27648
Potential for cogeneration of heat and electricity in California industry, phase 2
[NASA-CR-158772] N79-27658

CAMERA SHUTTERS
Dense transparent ferroelectric ceramics for optical applications
[BMFT-FB-T-78-17] N79-27319

CANADA
Canada report to COSPAR --- conferences
N79-27195
A plume dispersion study at Mildred Lake, Alberta
N79-27581
Tests of the climatological dispersion model and Gaussian Models at the Strait of Canso and at Lingan, Nova Scotia
N79-27584

CANARD CONFIGURATIONS
YF-17/ADEN system study
[NASA-CR-144882] N79-27126

CANCER
Study of pharmaceutical industrial problems
[NASA-CR-160267] N79-27852

CANOPIES
Aircraft transparency failure and logistical cost analysis. Volume 1: Program summary
[AD-A068719] N79-27131

CAPACITANCE
The capacitance of discs of arbitrary shape
[AD-A067758] N79-27928

CAPILLARY FLOW
Heat pipes with headers and single and two phase artery systems
[NEL-656] N79-27473
Mechanics of the microcirculation
N79-27847
Pulmonary circulation and microcirculation
N79-27849

CARBON DIOXIDE LASERS
Measurement of the rate constant for the NO+HO2 yields OH+NO2 reaction using laser magnetic resonance
[MPIS-8/1978] N79-27285
High power electric discharge laser
N79-27492

CARBON FIBER REINFORCED PLASTICS
Fracture mechanisms in fibrous composites --- glass and carbon fiber reinforced plastics
[AD-A067965] N79-27247

CARBON FIBERS
Design, manufacturing, and testing of spacecraft thrust cone made of Carbon Fiber Reinforced Plastic [CFRP]
[EMSB-79/78] N79-27240
Carbon fiber behavior in an enclosed volume
[NASA-CR-159076] N79-27718

CARBON MONOXIDE
Mathematical micromodel for local diffusion of carbon monoxide from motor vehicles
N79-27587

CARBON MONOXIDE LASERS
High power electric discharge laser
N79-27492

CARBONATES
Advanced technology fuel cell program --- molten carbonate and phosphoric acid fuel cells and coal utilization in power plants
[EPRI-EM-956] N79-27702

CARBONYL COMPOUNDS
Oxy anion-accelerated rearrangements
N79-27260
Orbital interactions in molecules studied by ultraviolet photoelectron spectroscopy --- ionization potentials and metal-metal bonding in transition metal carbonyl complexes
N79-27939

CARDIAC VENTRICLES
Characterization of cardiovascular function by automated monitoring of cardiac contractility and left ventricular wall motion activity
N79-27842

CARDIOVASCULAR SYSTEM
Effect of brief head-down hypokinesia on pressure in various parts of the healthy man's cardiovascular system
N79-27831
Characterization of cardiovascular function by automated monitoring of cardiac contractility and left ventricular wall motion activity
N79-27842

CASCADE FLOW
The unsteady aerodynamics of a cascade in translation
N79-27180
Supersonic unstalled flutter
N79-27181

CASCADE WIND TUNNELS
Study in a straight cascade wind tunnel of aeroelastic instabilities in compressors
N79-27178

CATALYSIS
The H-Coal processes: A status report
N79-27617
EXXON donor solvent coal liquefaction process
N79-27618
Methanol from coal
N79-27619
Catalysis by platinum single crystal surfaces: Low pressure hydrocarbon reactions and the effects of introducing strongly bound oxygen at the surface
N79-28012

CATALYSTS
Acidity distribution on oxide surfaces
N79-27258
Investigation of gasification of biomass in the presence of catalysts
[CONF-7809125-1] N79-27327

CATECHOLAMINE
Catecholamines and enzymes of metabolism thereof in the rat hypothalamus after flight aboard Cosmos-782 biosatellite
N79-27822

CATHODE RAY TUBES
An advanced cockpit instrumentation system: The coordinated cockpit display
[NASA-TM-78559] N79-27136

CATHODES
Surface flashover characteristics of alumina dielectric guide cathodes in an intense relativistic electron beam accelerator
N79-27955

CAUCHY PROBLEM
Hardy classes on Riemann surfaces
N79-27923

CAVITATION FLOW
Axial compressor stall --- effects on aircraft engines
N79-27435

CELESTIAL GEODESY
Transformations of spherical harmonics and applications to geodesy and satellite
[INPE-1453-RPE/018] N79-27895

CELESTIAL MECHANICS
Transformations of spherical harmonics and applications to geodesy and satellite
[INPE-1453-RPE/018] N79-27895

CELLS (BIOLOGY)
Preparation of guinea pig macrophage for electrophoretic experiments in space
[NASA-CR-158777] N79-27814
Biological effects of laser irradiation on nerve cells
N79-27840
Study of pharmaceutical industrial problems
[NASA-CR-160267] N79-27852

CELLULOSE
An evaluation of the reaction of cellulose with anhydrides/ammonia for the production of flame resistant cellulose derivatives
N79-27305

CENTRAL PROCESSING UNITS
Massively parallel processor computer
[NASA-CASE-GSC-12223-1] N79-27864

CENTRIFUGAL COMPRESSORS
Design, development, and test of a laser velocimeter for a small 8:1 pressure ratio centrifugal compressor
[NASA-CR-134781] N79-27478

CENTRIFUGES
An ultracentrifugal analysis of polymer size and heat stability of carrageenan
N79-27304

CERAMICS
Modules of rupture and oxidation resistance of S12.5SA0.6O0.72N3.52 sialon
[NASA-TP-1490] N79-27309
Analytical study on the ideal response of normal-mode shock-depoled PZT ferroelectric ceramics with resistive, capacities, and inductive loads
[AD-A068552] N79-27312
Dense transparent ferroelectric ceramics for optical applications
[BMFT-FB-T-78-17] N79-27319
Ceramic mainshaft roller bearing performance in a gas turbine engine
[AD-A067904] N79-27516
Performance prediction evaluation of ceramic materials in point-focusing solar receivers
[NASA-CR-158774] N79-27654
Assessment of materials for use in a solar ceramic receiver for chemical process heat
[ORNL/TM-6715] N79-27681

CHANNEL FLOW
The rotating hydraulics of steady flow in open channels
N79-27428

Flow through a furrowed channel. Part 1: Calculated flow patterns
[OUEL-1273/78] N79-27472
Two-dimensional MHD channel design
[CONF-781234-1] N79-28000

CHANNELS [DATA TRANSMISSION]
Massively parallel processor computer
[NASA-CASE-GSC-12223-1] N79-27864

CHARACTER RECOGNITION
Local neighborhood transition probability estimation and its use in contextual classification
[NASA-CR-160261] N79-27916

CHARGE DISTRIBUTION
The capacitance of discs of arbitrary shape
[AD-A067758] N79-27928

CHARGED PARTICLES
Review of neutrino physics at Brookhaven
[BNL-25378] N79-27948

CHARRING
Analysis of charring ablators
N79-27447

CHEBYSHEV APPROXIMATION
Some theorems and counterexamples in monotone approximation
N79-27893

CHECKOUT
Decommutator patchboard verifier
[NASA-CASE-KSC-11065-1] N79-27865
Bayesian software prediction models. Volume 5: Summary of technical progress
[AD-A067690] N79-27877

CHEMICAL ANALYSIS
Intervalence electron transfer in mixed-valence compounds
N79-27262
New instrumental, mathematical, and chemical developments for kinetic methods of analysis
N79-27267
Sampling and analysis methods for geothermal fluids and gases
[PNL-MA-572-APP] N79-27679
Chemical interaction of aqueous solutions with epidote-feldspar mineral assemblages in geologic systems
N79-27741

CHEMICAL BONDS
Magnetic exchange interactions in copper[II] complexes propagated by extended bridging groups
N79-27263
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
N79-27264
New perfluoropolymer-forming reactions
[AD-A067568] N79-27311

CHEMICAL COMPOSITION
The oxidizing behavior of some platinum metal fluorides
N79-27261
The identification and quantitation of UV absorbing compounds in serum by reversed-phase high performance liquid chromatography
N79-27269
Compatibility of elastomers in alternate jet fuels
[NASA-CR-158773] N79-27321
Mineralogy and chemistry of some unusual clay deposits in the Amargosa Desert, southern Nevada
N79-27623
The nuclear and atomic physics governing changes in the composition of relativistic cosmic rays
N79-28112
Measurement of the isotopic composition of the iron group elements in the galactic cosmic radiation
N79-28113

CHEMICAL ELEMENTS
On the origin of the elements: A brief review
[INPE-1466-RPE/019] N79-28087

CHEMICAL FRACTIONATION
Oxygen and hydrogen isotopic fractionation factors determined in experimental clay-water systems
N79-27740

CHEMICAL LASERS
High-power gas lasers, volume 2
[VKI-LECTURE-SERIES-65-VOL-2]
N79-27491
Chemical lasers
N79-27493
Studies of the Navy-ARPA Chemical Laser [NACL] exhaust
[AD-A068079] N79-27496

CHEMICAL PROPERTIES
The oxidizing behavior of some platinum metal fluorides
N79-27261
Assessment of materials for use in a solar ceramic receiver for chemical process heat
[ORNL/TM-6715] N79-27681

CHEMICAL REACTIONS
Influence of chemical reactions and other parameters on the hypersonic boundary layer in air
[KU-RZ-12/1977] N79-27106
Oxy anion-accelerated rearrangements
N79-27260
An evaluation of the reaction of cellulose with anhydrides/ammonia for the production of flame resistant cellulose derivatives
N79-27305
New perfluoropolymer-forming reactions
[AD-A067568] N79-27311
An algebraic expression for first-order reaction in laminar flow
N79-27470
An improved version of the reactive plume model [RPM-II]
N79-27568
The synthesis of organic reagents for the trace analysis of air pollutants
N79-27714
A microscopic, submicroscopic, and microseismic analysis of stable crack propagation and the effect of chemical environment on stable crack propagation in synthetic quartz
N79-28009

CHEMILUMINESCENCE
X-ray excited optical luminescence of poly-nuclear aromatic hydrocarbons
N79-27266
Chemiluminescence of dimethyldioxetane: Unimolecular generation of excited singlet and triplet acetone. Chemically initiated electron-exchange luminescence, the primary light generating reaction
[AD-A068920] N79-27281

CHIMNEYS
Dispersion from chimneys downwind of cubical buildings: A wind-tunnel study
N79-27547

CHLOROETHYLENE
Electrochemical fluorination of trichloroethylene and N, N-dimethyltrifluoroacetamide
[NASA-TM-79188] N79-27242

CHLOROPHYLLS
Applications of chlorophyll fluorescence transient measurements to the functional analysis of photosynthetic processes
N79-27813

CHROMIUM
Cyclic stress-strain behavior of ERNiCr-3 weld filler metal
[CONF-781202-31] N79-27535

CHROMIUM ALLOYS
Analytical representation of mechanical properties data for 2 1/4 Cr-1 Mo steel
[CONF-781219-6] N79-27296

CHROMIUM COMPOUNDS
Mass spectrometric investigation of the vaporization of sodium and potassium chromates: Preliminary results
[NASA-TM-79210] N79-27279

CHRONOLOGY
I-Xe dating of silicate and troilite from IAB iron meteorites
N79-28095

CIRCUIT BREAKERS
High pressure arcs in SF6. Part 4: Field strength measurements in blown SF6-arcs
[BMT-FB-T-78-06-PT-4] N79-27422

CIRCUIT DIAGRAMS
A dc model for power switching transistors suitable for computer-aided design and analysis
[NASA-CR-158764] N79-27396

CIRCUIT PROTECTION
A study of response time of pitot pressure probes designed for rapid response and protection of transducer
[NASA-TM-80091] N79-27462

CIRCUIT RELIABILITY
Decommutator patchboard verifier
[NASA-CASE-KSC-11065-1] N79-27865

CIRCUITS
General introductory remarks. A: Noise from fluid ejectors. B: Pressure fluctuations generated in a circuit by flow singularities. C: Use of correlation technique to noise source detection problem
N79-27512

CIRCULATORS [PHASE SHIFT CIRCUITS]
Magnetic effects in integrated optics
[LCR-494-292] N79-27982

CITIES
The application of a mathematical model to the estimation of the concentrations of pollutants in European cities
N79-27586
Determination of homogeneous zones by remote sensors
[INPE-1470-RPE/021] N79-27641
Sulfur and nitrogen compounds in urban aerosols
[BNL-25223] N79-27723

CIVIL AVIATION
Civil Aeronautics Board reports to Congress, fiscal year 1977 and transitional quarter
N79-27069

CLASSICAL MECHANICS
Semiclassical theory of electronically nonadiabatic transitions in molecular collision processes
[NASA-CR-158776] N79-27944

CLASSIFICATIONS
Classification of multispectral images of natural resources using table look-up approach and clustering
[INPE-1439-TDL/006] N79-27642
Local neighborhood transition probability estimation and its use in contextual classification
[NASA-CR-160261] N79-27916

CLASSIFIERS
Software requirements for the study of contextual classifiers and label imperfections
[NASA-CR-160239] N79-27875

CLAYS
Mineralogy and chemistry of some unusual clay deposits in the Amargosa Desert, southern Nevada
N79-27623
Oxygen and hydrogen isotopic fractionation factors determined in experimental clay-water systems
N79-27740

CLEAN ENERGY
A large scale wind energy program for the state of California
N79-27648

CLEAR AIR TURBULENCE
Meteorological and operational aspects of 46 clear air turbulent sampling missions with an instrumented B-57B aircraft. Volume 2, appendix C: Turbulence missions
[NASA-TM-80045] N79-27772

CLIMATE
Endurance and soil accumulation testing of photovoltaic modules at various MIT/LL test sites
[COO-4094-23] N79-27671
Summary of Meteorological Observations, Surface [SMOS] Corpus Christi, Texas
[AD-A067679] N79-27781

CLOUD COVER
Solar energy information and data for Illinois
[PB-292712/7] N79-27800

CMOS
Total-dose radiation-hardened CMOS integrated circuits
[AD-A067975] N79-27403

COAL
Stability of coal-oil mixtures --- conferences
[CONF-7805152-1] N79-27332
Evaluation of the flash desulfurization process for coal cleaning
[PB-292328/2] N79-27342
Coal supply for California
N79-27607
Prospects for coal slurry pipelines in California
N79-27608
Status of NO sub x control for coal-fired power plants
N79-27609
Economic comparison of fabric filters and electrostatic precipitators for particulate control on coal-fired utility boilers
N79-27610
Fluidized combustion of coal --- to limit SO2 and NOx emissions
N79-27613
Coal energy conversion options for Navy bases
[AD-A067463] N79-27667

COAL GASIFICATION
Coal gasification, commercial concepts, gas cost guidelines, revision 1
[FE-2240-100] N79-27331
Investigation of flow phenomena in pulverized coal gasification for the new process
[BMFT-FB-T-78-27] N79-27341
The Texaco coal gasification process for manufacture of medium BTU gas
N79-27614
Synthetic natural gas in California: When and why --- from coal
N79-27615
Methanol from coal
N79-27619

COAL LIQUEFACTION
Enthalpy measurement of coal-derived liquids
[FE-2035-12] N79-27282
Kinetics of coal liquefaction to preasphaltenes, asphaltenes and oils
N79-27320
Coal liquefaction: Report on a focus group discussion
[DOE/TIC-10039] N79-27339
Status report the SRC-1 and SRC-2 processes
N79-27616
The H-Coal processes: A status report
N79-27617
EXXON donor solvent coal liquefaction process
N79-27618

COAL UTILIZATION
Solvent Refined Coal [SRC] process: Environmental program. Volume 3: Pilot plant development work, part 5
[FE-0496-T8] N79-27329
Mixing and kinetic processes in pulverized coal combustors
[EPRI-FP-806-SY] N79-27330
Proceedings of the Conference on Coal Use for California
[NASA-CR-158770] N79-27597

Using coal inside California for electric power
N79-27598
Using coal inside California for nonelectric applications
N79-27599
A systems examination of the opportunities of coal for California
N79-27600
Coal's role in California's energy needs
N79-27602
Possible environmental effects of increased coal use in California
N79-27604
Air quality as a constraint to the use of coal in California
N79-27605
Water as a constraint to the use of coal for California
N79-27606
Economic considerations in coverting from oil/gas firing to coal
N79-27611
Direct firing of coal for power production
N79-27612
Locational response to regulatory policy: A regional analysis of energy facility location --- conferences
[BNL-23597] N79-27695
Advanced technology fuel cell program --- molten carbonate and phosphoric acid fuel cells and coal utilization in power plants
[EPRI-EM-956] N79-27702

COASTAL CURRENTS
Comparison of model and observed nearshore circulation
[ANL/EES-CP/22] N79-27808

COASTAL RANGES [CA]
Summary of Meteorological Observations, Surface [SMOS], Imperial Beach, California
[AD-A067680] N79-27783

COASTAL WATER
Continental margin atmospheric climatology and sea level 1974-1975
[PB-293734/0] N79-27799

COASTS
Numerical simulations of coastal-zone boundary layer ventilation and pollution transport
N79-27591

COAXIAL NOZZLES
Studies of the acoustic transmission characteristics of coaxial nozzles with inverted velocity profiles: Comprehensive data report --- nozzle transfer functions
[NASA-CR-159628] N79-27933

COBALT ALLOYS
Mossbauer study of Y[Fe(0.022]Co[0.978]2] from 259K to 0.18K using a stochastic model of magnetic ordering
N79-28014

COCKPITS
An advanced cockpit instrumentation system: The coordinated cockpit display
[NASA-TM-78559] N79-27136

CODING
Software coding for reliable data communication in a reactor safety system
[OUEL-1264/78] N79-27379

COGNITIVE PSYCHOLOGY
The effects of context on multidimensional spatial cognitive models
[NASA-TM-58219] N79-28045

COLD FRONTS
Statistical nature of cold fronts within the Gulf of Mexico and their potential influence on OTEC operations
[PNL-2878] N79-27786

COLD WEATHER TESTS
Computer modeling of atmospheric ice accretion
[AD-A068582] N79-27785

COLLOIDS
An ultracentrifugal analysis of polymer size and heat stability of carrageenan
N79-27304
Colloid and other forces in particle adhesion and particle removal: A review
N79-27318

COLOR
Theory of spectral radiance of pollutants at sea, volume I
[NASA-CR-158791] N79-27633
Interactions of heavy quarks in quantum chromodynamics
N79-28035

COLORADO
Short term sediment movements and related channel charges: The Piceance Basin, Colorado
N79-27622

COLUMNS [PROCESS ENGINEERING]
A systematic approach to open tubular column gas-chromatographic instrumentation
N79-27271

COMBAT
Response characteristics of Knollenberg light-scattering aerosol counters
[AD-A067701] N79-27750

COMBINATORIAL ANALYSIS
Efficient feature subset selection with probabilistic distance criteria --- pattern recognition
[NASA-CR-160263] N79-27917

COMBUSTION
Combustion
[VKI-LECTURE-SERIES-22] N79-27276
The basic equations
N79-27277
Combustion fundamentals
N79-27278
CARS investigations in sooting and turbulent flames
[AD-A069169] N79-27468

COMBUSTION CHAMBERS
Combustor design criteria validation. Volume 2: Development testing of two full-scale annular gas turbine combustors
[AD-A067689] N79-27145
Combustor design criteria validation. Volume 1: Element tests and model validation
[AD-A067657] N79-27146
Mixing and kinetic processes in pulverized coal combustors
[EPRI-FP-806-SY] N79-27330
Reduction of particulate carryover from a pressurized fluidized bed
[NASA-TM-79216] N79-27664

COMBUSTION EFFICIENCY
Soot formation in combustion
[MPIS-22/1978] N79-27288
High performance N2O4/amine elements blowapart
[NASA-CR-160272] N79-27323
High performance N2O4/amine elements blowapart
[NASA-CR-160273] N79-27324
Fluidized combustion of coal --- to limit SO2 and NOx emissions
N79-27613

COMBUSTION PHYSICS
Combustion
[VKI-LECTURE-SERIES-22] N79-27276
The basic equations
N79-27277
Combustion fundamentals
N79-27278

COMBUSTION PRODUCTS
Soot formation in combustion
[MPIS-22/1978] N79-27288

COMMERCE
Shale oil: Focus group results
[DOE/TIC-10019] N79-27644

COMMERCIAL ENERGY
Environmental readiness document. Solar: Hot water and passive, commercialization phase 3 planning
[DOE/ERD-0010] N79-27690

COMMITTEE ON SPACE RESEARCH
Space activity in Austria, 1976/77
N79-28060

COMMUNICATION EQUIPMENT
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160271] N79-27349

COMMUNICATION NETWORKS
Propagation effects on satellite communication systems operating in the range of 240 to 3000 megahertz
[AD-A067535] N79-27358

COMMUNICATION SATELLITES
Nuclear powered satellite studies
[COO-4045-3] N79-27221
Satellite communications for disaster relief operations
[NASA-TM-79198] N79-27351
Propagation effects on satellite communication systems operating in the range of 240 to 3000 megahertz
[AD-A067535] N79-27358
Feasibility study for a satellite frequency modulated radio communication system
[ESA-CR[P]-1151-VOL-1] N79-27376
Feasibility of large orbital antennas
[DFH/DSP-032/78-VOL-2] N79-27377
Fault tolerant spaceborne computer study. Preprocessor design
[AD-A067693] N79-27866

COMPLEX VARIABLES
Indicial response invariance in discrete time variable systems
[FUB-42-1977] N79-27912

COMPONENT RELIABILITY
Component modelling of microwave transistors
[REPT-72/78/91-ISSUE-2] N79-27415

COMPOSITE MATERIALS
Advanced composites in sailplane structures: Application and mechanical properties
N79-27079
Effects of space environment on composites: An analytical study of critical experimental parameters
[NASA-CR-158767] N79-27244
Flight service evaluation of Kevlar-49 epoxy composite panels in wide-bodied commercial transport aircraft
[NASA-CR-159071] N79-27246
Introduction to composite materials. Volume 1: Deformation of unidirectional and laminated composites
[AD-A067544] N79-27248
User manuals for three computer programs for analysis of composite materials [LOPT, SOPT, SOC]
[FFA-TN-HU-2054] N79-27252
Development of glass compositions for immobilization of SRP waste
[DP-1517] N79-27965

COMPOSITE PROPELLANTS
The utilization of a national polymer acquired for solid propellants used in space vehicles
[INPE-1473-RPE/024] N79-27325

COMPOSITE STRUCTURES
Effect of variances and manufacturing tolerances on the design strength and life of mechanically fastened composite joints
[AD-A069170] N79-27518

COMPRESSED AIR
Geologic assessment of compressed air storage sites in Kansas
[EPRI-EM-877] N79-27689
Performance of a hydraulic air compressor for use in compressed air energy storage power systems --- Conferences
[CONF-781202-27] N79-27693

COMPRESSIBLE FLOW
Unsteady flows --- flow equations
N79-27431
Time dependent methods for multi-dimensional compressible flow problems
N79-27450

COMPRESSIBLE FLUIDS
A split finite element algorithm for the compressible Navier-Stokes equations
N79-27463

COMPRESSION LOADS
The buckling of short tubes under external pressure
[OUEL-1258/78] N79-27542

COMPRESSOR BLADES
Some theoretical and experimental investigations of stresses and vibrations in a radial flow rotor
N79-27158
Modal analysis of compressor blades by means of impulse excitation
N79-27165

COMPRESSORS
Handling problems through compressor deterioration
N79-27169
Study in a straight cascade wind tunnel of aeroelastic instabilities in compressors
N79-27178
Performance of a hydraulic air compressor for use in compressed air energy storage power systems --- Conferences
[CONF-781202-27] N79-27693

COMPUTATIONAL FLUID DYNAMICS
Computation of potential flow around bodies
N79-27456
Recent developments in the numerical treatment of partial differential equations
N79-27457

COMPUTER ASSISTED INSTRUCTION
Correcting memory of microcontrol system aided by a computer
[INPE-1489-TDL/009] N79-27874

COMPUTER GRAPHICS
An advanced cockpit instrumentation system: The coordinated cockpit display
[NASA-TM-78559] N79-27136
Preliminary trend monitoring system data manager's guide
[NASA-CR-160251] N79-27232
GRAPH: An interactive computer program used for technical plotting
[AD-A068668] N79-27881

COMPUTER NETWORKS
LLL Octopus network: Some lessons and future directions
[UCRL-81067] N79-27885

COMPUTER PROGRAMMING
Computation of attenuation and phase shift per unit length due to spherical rain drops
[FUB-24-1977] N79-27375
Software coding for reliable data communication in a reactor safety system
[OUEL-1264/78] N79-27379
A computer program for calculating infrared fluxes
[KNMI-WR-78-15] N79-27766
Roscoe user guide, version 1.1
[AD-A068864] N79-27883

COMPUTER PROGRAMS
Calculation of skin friction in two-dimensional, transonic, turbulent flow --- computer programs
[AD-A067423] N79-27102
Summary of results for a twin-engine, low-wing airplane substructure crash impact condition analyzed with program KRASH
[AD-A069171] N79-27116
NASCAP user's manual, 1978
[NASA-CR-159417] N79-27398
The marker-and-cell method
N79-27451

HSLAB: An interactive program for one dimensional heat flow problems
[FOA-C-20288-D6[A3]] N79-27474
Reliability of steam turbine rotors
[EPRI-NP-923-SY] N79-27519
The NASTRAN theoretical manual [level 16.0]
[NASA-SP-221[03]] N79-27531
Validation of CRSTER model air quality estimates for an industrial plant
N79-27583
Stability sensitivity of the climatological dispersion model: A practical examination --- using emission data from an industrial plant
N79-27588
Program library for handling and processing of remotely sensed multispectral data
[FOA-C-30146-E1] N79-27646
A new hardware approach to coefficient determination for the linear prediction of speech
N79-27863
Automatic discovery of heuristics for non-deterministic programs
[AD-A067546] N79-27876
Bayesian software prediction models. Volume 5: Summary of technical progress
[AD-A067690] N79-27877
Computer programs for scoring test data with item characteristic curve models
[AD-A067752] N79-27878
Investigating software development approaches
[AD-A068742] N79-27880
GRAPH: An interactive computer program used for technical plotting
[AD-A068668] N79-27881
Alternative, semi-automated method for performing multiobjective analyses
[BNL-50892] N79-27921
Calculation of functions of some particular matrices
[FUB-11-1977] N79-27926
Computation of minimum noise aircraft landing trajectories
[NASA-CR-158931] N79-27929
Computation of H2O quadrupole moment matrix elements for pressure broadening calculations
[AD-A068569] N79-27945

COMPUTER SYSTEMS PROGRAMS
Numerical and software requirements for general nonlinear finite element analysis
N79-27527
Meta assembler enhancements and generalized linkage editor
[NASA-CR-161255] N79-27872
Software requirements for the study of contextual classifiers and label imperfections
[NASA-CR-160239] N79-27875
Investigating software development approaches
[AD-A068742] N79-27880
Computer software for planning design of community energy systems
[CONF-781182-2] N79-28063

COMPUTER TECHNIQUES
Engine/aircraft structural integration: An overview
N79-27167
Automatic flowmeter calibration system
[NASA-CASE-KSC-11076-1] N79-27479
A framework for artificial intelligence
[AD-A068188] N79-27886
Feasibility study of a computerized management information system for the NOAA Corps personnel system
[AD-A068578] N79-28047
Decision making and problem solving with computer assistance
[FB-36] N79-28048
Analysis of costs and benefits in automated information systems
[FUB-45-1977] N79-28055

COMPUTERIZED DESIGN
A dc model for power switching transistors suitable for computer-aided design and analysis
[NASA-CR-158764] N79-27396

COMPUTERIZED SIMULATION
The computation of optimal aircraft trajectories
[RE-577] N79-27128
Aeronautical research into vertical problems in V/STOL aircraft approach landing
[IFD-4-78] N79-27134
Combustor design criteria validation. Volume 2: Development testing of two full-scale annular gas turbine combustors
[AD-A067689] N79-27145
Combustor design criteria validation. Volume 1: Element tests and model validation
[AD-A067657] N79-27146
Guidance Simulation Techniques
N79-27229
Advanced theory of the Stirling cycle digital simulation of regenerative engine operation
N79-27504
Verification of the MADCAP model of photochemical air pollution in the San Diego air basin
N79-27573
A consideration of measures and standards of performance of air quality simulation models
N79-27589
Computer predictions of photochemical oxidant levels for initial precursor concentrations characteristic of southeastern Virginia
[NASA-TM-80111] N79-27717
Computer modeling of atmospheric ice accretion
[AD-A068582] N79-27785
Wind trajectory models
[KNMI-WR-78-6] N79-27787
Experiments with iterative methods for solving the discrete Poisson equation
[KNMI-WR-79-1] N79-27914

COMPUTERS
Generalized element method
[COO-2383-0055] N79-27906

CONCENTRATING
An environmental assessment of sewerage centralization with special reference to New York State
N79-28061

CONCENTRATION [COMPOSITION]
The ratio of peak 1-hour average concentrations to peak concentrations of other averaging times for various pollutants and differing sources
N79-27582
The application of a mathematical model to the estimation of the concentrations of pollutants in European cities
N79-27586
Computer predictions of photochemical oxidant levels for initial precursor concentrations characteristic of southeastern Virginia
[NASA-TM-80111] N79-27717
Investigation of albumin and globulin composition of blood of the crew of the Salyut-3 orbital station
N79-27820

CONCENTRATORS
Test of concentrator solar array model for SEPS
[NASA-TM-78230] N79-27662

CONCRETES
Transient heat transfer in concrete
[CONF-781079-4] N79-27469

CONDENSERS [LIQUIFIERS]
Eddy current probe gun
[TDB-312] N79-27416

CONDENSING
Onset of condensation effects as detected by total pressure probes in the Langley 0.3-meter transonic cryogenic tunnel
[NASA-TM-80072] N79-27094
Condensation on a noncollapsing vapor bubble in a subcooled liquid
[NASA-TM-79212] N79-27461

CONDUCTIVITY
Electrical group impedance measurements in the United States between 200 and 415 kHz
[AD-A068088] N79-27352

CONFERENCES
Science and Technology of Low Speed and Motorless Flight. Third International Symposium
[NASA-CR-2085] N79-27070
Stresses, vibrations, structural integration and engine integrity [including aeroelasticity and flutter]
[AGARD-CP-248] N79-27148
Review of the AGARD S and M panel evaluation program of the NASA-Lewis SRP approach to high-temperature LCF life prediction
N79-27179
Canada report to COSPAR --- conferences
N79-27195
Stability of coal-oil mixtures --- conferences
[CONF-7805152-1] N79-27332
Material and energy balances in the production of ethanol from wood --- conferences
[CONF-7806139-1] N79-27338
Fifth European Specialist Workshop on Microwave Active Semiconductor Devices
[AD-A067492] N79-27405
Assessment of load management on the electric power system --- conferences
[CONF-781182-3] N79-27412
Crossed laser and molecular beam study of multiphoton dissociation of C2F5Cl
[LBL-8090] N79-27498
Proceedings of the Ninth International Technical Meeting on Air Pollution Modeling and its Application
[REPT-103] N79-27543
Proceedings of the Conference on Coal Use for California
[NASA-CR-158770] N79-27597
Proceedings of the Distribution Automation and Control Working Group. Volume 2: Proceedings
[NASA-CR-158769] N79-27659
Mead 25 kilowatt photovoltaic system --- conferences
[COO-4094-19] N79-27677
Modeling passive solar buildings with hand calculations --- conferences
[LBL-8583] N79-27683
Performance of a hydraulic air compressor for use in compressed air energy storage power systems --- Conferences
[CONF-781202-27] N79-27693
Impacts of new energy technologies as measured against reference energy systems --- conferences
[BNL-25475] N79-27694
Locational response to regulatory policy: A regional analysis of energy facility location --- conferences
[BNL-23597] N79-27695
Amoco Cadiz: Preliminary observations of the oil spill impact on the marine environment --- conference proceedings, Brest, 7 Jun. 1978
[CNEXO-6-1978] N79-27726
Acoustic emission sources in brittle solids --- conferences
[LBL-8335] N79-27937
Design improvements simplify remote maintenance of tokamaks --- conferences
[CONF-781105-86] N79-28003

CONFIGURATION INTERACTION
The calculation of autoionization positions and widths with applications to penning ionization reactions
N79-27254
Piecewise polynomial configuration interaction natural orbital study of 1s2 helium
N79-27259

CONGRESSIONAL REPORTS
Civil Aeronautics Board reports to Congress, fiscal year 1977 and transitional quarter
N79-27069
Alcohol fuels
[GPO-22-334] N79-27322
Federal Information Centers Act --- congressional reports
[H-REPT-95-1530] N79-28049
Department of Housing and Urban Development, independent agencies appropriation bill, 1980 --- congressional reports
[S-REPT-96-258] N79-28057

CONSTRAINTS
Air quality as a constraint to the use of coal in California
N79-27605
Water as a constraint to the use of coal for California
N79-27606

CONTAMINANTS
Electrochemical apparatus for analyzing carbon monoxide, hydrogen sulfide, hydrogen and sulfur dioxide
[BMFT-FB-T-78-08] N79-27729
Development of hydrogen and hydroxyl contamination in thin silicon dioxide thermal films
[AD-A067963] N79-28027

CONTINENTAL DRIFT
Geology of the passive margin of New England
[PB-294473/4] N79-27768

CONTINENTAL SHELVES
A comparison of simulated and experimental wave spectra in the nearshore region
[NASA-TM-80478] N79-27806

CONTRACT MANAGEMENT
F-16 reliability improvement warranty. Implementation and management plan
[AD-A068561] N79-27133

CONTROL EQUIPMENT
Guidance and control for tactical guided weapons with emphasis on simulation and testing
[AGARD-LS-101] N79-27225
Extreme ultraviolet diagnosis of a neutral-beam-heated mirror machine
N79-27994

CONTROL SIMULATION
Testing of missile guidance and control systems
N79-27231

CONTROL SURFACES
Pressure distributions on three different cruciform aft-tail control surfaces of a wingless missile at mach 1.60, 2.36, and 3.70 Volume 1: Trapezoidal tail --- conducted in Langley Unitary Plan wind tunnel
[NASA-TM-80097] N79-27099
Aerodynamic controls
N79-27204

CONTROL THEORY
The systemic principles of building a man-machine control staff --- functional analysis
N79-27861

CONTROLLABILITY
A comparison of the V/STOL handling qualities of the VAK-191B with the requirements of AGARD report 577 and MIL-F-83300
[NASA-TP-1494] N79-27182

CONVECTION
The effect of a moving lithospheric plate on convection in the Earth's mantle
N79-27736

CONVEXITY
A duality theory for a class of problems with essentially unconstrained duals
[AD-A067755] N79-27924

COOLING SYSTEMS
Reliability and maintainability evaluation of freezing in solar systems
[ANL/SDP/TM-78-3] N79-27674

COPPER COMPOUNDS
Magnetic exchange interactions in copper[II] complexes propagated by extended bridging groups
N79-27263

CORRELATION COEFFICIENTS
Correlation of narrow band receiver signals with reflection interference of the incident wave field
[REPT-6-78] N79-27371
CORRELATION DETECTION
Correlation techniques and optimum signal methods in laser optics radar systems and practical measurement technique possibilities
[ILR-33] N79-27499
CORROSION RESISTANCE
Prelimary results of tests of proprietary chemical additives, seeding, and other approaches for the reduction of scale in hypersaline geothermal systems
[UCID-18051] N79-27669
CORROSION TESTS
Atlas 5013 tank corrosion test
[NASA-CR-158760] N79-27234
Thermoplastic materials corrosion in 40% KOH [120 C - 180 C]
[P/539/77/26] N79-27315
COSMIC DUST
Laboratory analogues to cosmic dust
N79-27275
COSMIC RAYS
The nuclear and atomic physics governing changes in the composition of relativistic cosmic rays
N79-28112
Measurement of the isotopic composition of the iron group elements in the galactic cosmic radiation
N79-28113
The mean free path of low rigidity cosmic rays
[NASA-TM-80290] N79-28114
COSMOLOGY
Gauge invariant perturbation theory in spatially homogeneous cosmology
N79-28086
Globally baryon symmetric cosmology, GUT spontaneous symmetry breaking, and the structure of the universe
[NASA-TM-80306] N79-28090
COSMONAUTS
Investigation of albumin and globulin composition of blood of the crew of the Salyut-3 orbital station
N79-27820
COST ANALYSIS
Aircraft transparency failure and logistical cost analysis. Volume 1: Program summary
[AD-A068719] N79-27131
COST EFFECTIVENESS
Economic considerations in coverting from oil/gas firing to coal
N79-27611
Supply-demand price coordination in water resources management
[IIASA-RR-78-11] N79-27627
COST ESTIMATES
Coal gasification, commercial concepts, gas cost guidelines, revision 1
[FE-2240-100] N79-27331
Federal photovoltaic utilization program. Planning resource document
[HCP/M50081-01] N79-27706
COSTS
Findings and views concerning the exemption of aviation gasoline from the mandatory petroleum allocation and price regulations
[DOE/ERA-0024] N79-27336
COULOMB COLLISIONS
Determination of NYK coupling constants by the Haber-Schaim method
[REPT-87] N79-27953
A theory of local and global processes which affect solar wind electrons. 2: Experimental support
[NASA-TM-79628] N79-28109
COUNTERMEASURES
Application of a correlation discriminant operator to perturbational adaptive algorithms
[AD-A068890] N79-27362
COUPLERS
A central multichannel coupler for connections between fiber optic bundles
[LCR-14077] N79-27369
COUPLING
Determination of NYK coupling constants by the Haber-Schaim method
[REPT-87] N79-27953
CRACK PROPAGATION
The directional stability of crack propagation
N79-27530
Effects of geometric variables on stress intensity factors for crack gages
[AD-A068631] N79-27533
A microscopic, submicroscopic, and microseismic analysis of stable crack propagation and the effect of chemical environment on stable crack propagation in synthetic quartz
N79-28009
CRACKING [CHEMICAL ENGINEERING]
Acidity distribution on oxide surfaces
N79-27258
CRACKS
Ultrasonic inspection of engine nacelle structure searching for cracks
[REPT-7610.909] N79-27522
CRASHES
Summary of results for a twin-engine, low-wing airplane substructure crash impact condition analyzed with program KRASH
[AD-A069171] N79-27116
CREEP RUPTURE STRENGTH
Modules of rupture and oxidation resistance of Si12.55Al0.6O0.72N3.52 sialon
[NASA-TP-1490] N79-27309
CRITERIA
Prospects for heavy/medium duty automotive stirling engines
N79-27505
CROP GROWTH
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629
The Tergra model: A mathematical model for the simulation of the daily behavior of crop surface temperature and actual evapotranspiration
[REPT-1014] N79-27645
CROP INVENTORIES
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629
CROSSED FIELDS
Crossed-field closing switch development
[AD-A068185] N79-27407
CRUDE OIL
Stability of coal-oil mixtures --- conferences
[CONF-7805152-1] N79-27332
Findings and views concerning the exemption of aviation gasoline from the mandatory petroleum allocation and price regulations
[DOE/ERA-0024] N79-27336
Midterm oil and gas supply modeling system methodology description
[DOE/EIA-0103/17] N79-28059
CRYOGENIC WIND TUNNELS
Onset of condensation effects as detected by total pressure probes in the Langley 0.3-meter transonic cryogenic tunnel
[NASA-TM-80072] N79-27094
CRYOGENICS
Cryogenic laser fusion target materials
[LA-UR-79-101] N79-28002
CRYSTAL DEFECTS
The scattering of thermal phonons by extended defects in dielectric crystals
N79-28017
CRYSTAL GROWTH
A study of crystal growth by solution technique --- triglycine sulfate single crystals
[NASA-CR-158763] N79-28024
CRYSTAL LATTICES
Kinetic models for irreversible processes on a lattice
N79-28011
CRYSTALLOGRAPHY
Cape York: The extraordinary mineralogy of an ordinary iron meteorite and its implication for the genesis of III AB irons
N79-28099
CRYSTALS
Some observable properties of crystalline electrons in magnetic fields: Exact results in model crystals
N79-28018
CULTIVATION
Preparation of guinea pig macrophage for electrophoretic experiments in space
[NASA-CR-158777] N79-27814
CULTURE TECHNIQUES
Study of pharmaceutical industrial problems
[NASA-CR-160267] N79-27852
CURRENT DISTRIBUTION
Assessment of load management on the electric power system --- conferences
[CONF-781182-3] N79-27412
CURVE FITTING
Application of curve-fitting to X-ray photoelectron spectroscopy and cyclic voltammetry
N79-27265
CYANIDES
IR laser induced dissociation of N2F4 and isomerization of CH3NC
[MPIS-12/1978] N79-27287
CYCLIC COMPOUNDS
Mechanistic studies in the organic solid state
N79-28008
CYCLIC LOADS
Cyclic stress-strain behavior of ERNiCr-3 weld filler metal
[CONF-781202-31] N79-27535
CYGNUS CONSTELLATION
The hadron spectrum at ground level, part 1. The stability of the period of cygnus x-3, part 2
N79-28072

D

DATA ACQUISITION
Compilation and analysis of data sets for the evaluation of regional sulfate models
N79-27579
Analysis of factors affecting water level recovery data
N79-27621
Design development and implementation of data acquisition systems for photovoltaic tests and applications project
[COO-4094-24] N79-27672
Mead 25 kilowatt photovoltaic system --- conferences
[COO-4094-19] N79-27677
The 12831D Lance missile number 3306, round number 323, ESL
[AD-A067687] N79-27779
The 19303 GSRS. Missile number 1013, round number V-13,
[AD-A067686] N79-27780
Summary of Meteorological Observations, Surface [SMOS], Imperial Beach, California
[AD-A067680] N79-27783
DATA BASES
Nondestructive testing information analysis center, 1978
[AD-A068669] N79-27525
SBIBLI: A data base system for bibliographic references
[FFM-264] N79-28052
Performance evaluation of a prototype relational data base handler for technical and scientific data processing
[FOA-C-20281-D8] N79-28054
DATA COMPRESSION
ORRC/SAIL interface control document for SAIL OFT data tapes, revision A
[NASA-TM-80479] N79-27873
DATA CORRELATION
Correlation of predicted and measured thermal stresses on an advanced aircraft structure with dissimilar materials --- hypersonic heating simulation
[NASA-TM-72865] N79-27088
DATA MANAGEMENT
Preliminary trend monitoring system data manager's guide
[NASA-CR-160251] N79-27232
DATA PROCESSING
Missile guidance techniques
N79-27230
Apollo telescope mount: A partial listing of scientific publications and presentations, supplement 3
[NASA-TM-78303] N79-27500
Classification of multispectral images of natural resources using table look-up approach and clustering
[INPE-1439-TDL/006] N79-27642
Program library for handling and processing of remotely sensed multispectral data
[FOA-C-30146-E1] N79-27646
Studies in modeling, reduction and filtering of potential field data
N79-27737
Measurements of rainfall intensity: Instrumentation and data processing
[FOA-C-30157-E2,E1] N79-27794
The specification of a decompilation methodology for data flow schema
N79-27871
On the complexity of multivariable query evaluation
[FOA-C-20292-D8] N79-27913
Study of real-time converter of an incoherent image into a transparency: Optical to optical converter/technology study
[ESA-CR[P]-1155] N79-27988
Performance evaluation of a prototype relational data base handler for technical and scientific data processing
[FOA-C-20281-D8] N79-28054
DATA RECORDING
Seismological recordings of nuclear explosions in 1976 obtained at the Hagfors observatory in Sweden
[FOA-C-20275-11] N79-27764
DATA REDUCTION
Interferometric techniques and data evaluation methods for the utias 10 cm x 18 cm hypervelocity shock tube
[AD-A067957] N79-27187
Apollo telescope mount: A partial listing of scientific publications and presentations, supplement 3
[NASA-TM-78303] N79-27500
Studies in modeling, reduction and filtering of potential field data
N79-27737
DATA SYSTEMS
SBIBLI: A data base system for bibliographic references
[FFM-264] N79-28052
Performance evaluation of a prototype relational data base handler for technical and scientific data processing
[FOA-C-20281-D8] N79-28054

DATA TRANSMISSION
Indicial response invariance in discrete time variable systems
[FUB-42-1977] N79-27912
DECISION MAKING
Electric utilities and solar energy: The service contract in a new social context
[ORAU/IEA[O]-79-3] N79-27685
Impacts of new energy technologies as measured against reference energy systems --- conferences
[BNL-25475] N79-27694
Alternative, semi-automated method for performing multiobjective analyses
[BNL-50892] N79-27921
The effects of context on multidimensional spatial cognitive models
[NASA-TM-58219] N79-28045
A bi-extremal principle for estimating efficiency frontier parameter values
[AD-A068992] N79-28046
Decision making and problem solving with computer assistance
[FB-36] N79-28048
DECISION THEORY
A secretary problem with a random number of choices
[AD-A068186] N79-27902
Induction of decision rules
[INPE-1492-RPE/036] N79-27920
DECODERS
Decommutator patchboard verifier
[NASA-CASE-KSC-11065-1] N79-27865
DECODING
The third millenium roots of Babylonian mathematics. Part 1: A method for the decipherment, through mathematical and metrological analysis, of Proto-Sumerian and Proto-Elamite semi-pictograph inscriptions
[CTH-MATH-1978-9] N79-27910
DECOMMUTATORS
Decommutator patchboard verifier
[NASA-CASE-KSC-11065-1] N79-27865
DECOMPRESSION SICKNESS
Probability of caisson disease while wearing a space suit when exiting from a spacecraft with an atmosphere close to that of earth
N79-27826
DEEP SPACE
Space augmentation of military high-level waste disposal
[NASA-CR-158771] N79-27193
DEFENSE INDUSTRY
Waste management
[DPST-78-125-2] N79-27964
DEFORMATION
Introduction to composite materials. Volume 1: Deformation of unidirectional and laminated composites
[AD-A067544] N79-27248
A study of the ordering and strengthening mechanisms in an off-stoichiometric Ni-Mo alloy
N79-27292
Strike-slip faulting: Models for deformation in a non-uniform crust
N79-27735
DEGASSING
Nonmetallic materials handbook. Volume 1: Epoxy materials
[NASA-CR-3133] N79-27307
DEGRADATION
Fracture mechanisms in fibrous composites --- glass and carbon fiber reinforced plastics
[AD-A067965] N79-27247
DEGREES OF FREEDOM
Degrees of freedom in the layout of Stirling engines
N79-27507
DELAMINATING
Experimental and analytical study of fatigue damage in notched graphite/epoxy laminates
[NASA-TM-80121] N79-27245
DELTA WINGS
Lee side flow field over slender delta wings of finite thickness
[ILR-23] N79-27103
DEMAND [ECONOMICS]
The 1980 motor gasoline supply and demand. Analysis memorandum AM/ES/79-12
[DOE/EIA-0102/32] N79-27337
Energy supply and demand in California
N79-27603
Comprehensive areal model of residential heating demands
[BNL-24998] N79-27692
DENMARK
Activities of the Laboratory of Electromagnetic Theory
N79-27367
Oceanographical observations from Danish lightvessels and coastal stations
[ISBN-87-7478-151-0] N79-27809
DENSITY MEASUREMENT
Relationship of PVT conditions and specific heat capacity of oils for thermodynamic measurements
[NEL-658] N79-28043
DEPOSITION
Kinetics of silica deposition from simulated geothermal brines
[CONF-790108-1] N79-27691
The 911 years of microparticle deposition at the South Pole: A climatic interpretation
N79-27732
DESIGN ANALYSIS
Extension of running time in the RAE hypersonic shock tunnel
[OUEL-1260/78] N79-27191
Spacelab follow-on development: Executive summary. Heat rejection augmentation and increased capability for the Spacelab liquid loops
[RP-AI-0239] N79-27238
Description of the possibilities for energy savings during the design and construction of apertures in buildings [cross-section report]
[BMFT-FB-T-78-15] N79-27345
Degrees of freedom in the layout of Stirling engines
N79-27507
Unique requirements for the cooperation of computation and design in the development of Stirling engines
N79-27508
Proposal for a modification of SPICA
[REPT-78-112] N79-28006
DESORPTION
Dissolution processes of aluminum oxide on tungsten, iridium, molybdenum, tantalum, and rhenium as a function of electric field strength
N79-28013
DESULFURIZING
Evaluation of the flash desulfurization process for coal cleaning
[PB-292328/2] N79-27342
Coal energy conversion options for Navy bases
[AD-A067463] N79-27667
DETERIORATION
Handling problems through compressor deterioration
N79-27169
DETONABLE GAS MIXTURES
An experimental study of the sensitiveness of unconfined hydrocarbon-air mixtures to direct detonative initiation
[PERME-TR-44] N79-27340
DETONATION
An experimental study of the sensitiveness of unconfined hydrocarbon-air mixtures to direct detonative initiation
[PERME-TR-44] N79-27340
DEUTERIUM PLASMA
Thermonuclear reaction rates in a deuterium-tritium plasma
[FOA-C-20283-A2] N79-28044
DIAGNOSIS
ESR studies on different pathological states
[ISS-L-22/9] N79-27854
DIATOMIC MOLECULES
A vibrational bias mechanism for diatomic dissociation: Induction times. steady rates, and activation energies
N79-27255
DIELECTRIC PROPERTIES
The scattering of thermal phonons by extended defects in dielectric crystals
N79-28017
DIELECTRICS
Magnetic effects in integrated optics
[LCR-494-292] N79-27982
Characteristics of low loss optical fibers obtained from commercially available dielectrics
[FUB-21-1977] N79-27986
DIESEL ENGINES
Diesel organic rankine cycle compound engine [Bottoming Cycle] program plan
[DOE/CS-0052] N79-27521
DIFFERENCE EQUATIONS
Effective difference method for solving non-stationary two dimensional hypersonic flow boundary layer problems under chemical nonequilibrium conditions
[KU-RZ-9/1977] N79-27104
DIFFERENTIAL EQUATIONS
A numerical fluid dynamics calculation method for all flow speeds
N79-27454
Recent developments in the numerical treatment of partial differential equations
N79-27457
Stability of variable-step methods for ordinary differential equations
[COO-2383-0048] N79-27907
Backward solution of nonlinear differential equations. Part 2: Nonlinear equations with forced functions
[FOA-C-20284-E3] N79-27909
DIFFRACTION
Physical processes in positron scattering at metal surfaces
N79-28021
DIFFUSION
Prairie grass revisited: Optimum indicators of vertical spread
N79-27563
Mathematical micromodel for local diffusion of carbon monoxide from motor vehicles
N79-27587
Image quality of a Wolter-1 type X-ray telescope under particular contrast reduction conditions due to diffuse reflection
[MPI-PAE/EXTRATERR-145] N79-27984
DIFFUSION COEFFICIENT
A systematic approach to open tubular column gas-chromatographic instrumentation
N79-27271
Critical review of dispersion coefficients measured and applied in the Federal Republic of Germany
N79-27556
Measurements of dispersion coefficients in cold environment
N79-27560
New sets of diffusion parameters resulting from tracer experiments in 50 and 100 metres release height
N79-27564
Dispersion parameters determined from measurements of wind fluctuations [sigma sub theta], temperature and wind profiles
N79-27566
DIFFUSION FLAMES
CARS investigations in sooting and turbulent flames
[AD-A069169] N79-27468
DIGITAL COMPUTERS
Design of automatic test equipment for developmental TWT's
[AD-A067553] N79-27404
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 2: Calculational aspects of solving the large systems of linear algebraic equations on a digital computer
N79-27459
DIGITAL DATA
ORRC/SAIL interface control document for SAIL OFT data tapes, revision A
[NASA-TM-80479] N79-27873
Human read - machine read microfilm mass memory system
[AD-A068892] N79-28051
DIGITAL RADAR SYSTEMS
Formation tracking, part 1: Basic theory and formation track initiation
[FFM-265] N79-27373
DIGITAL SIMULATION
Aircraft hydraulic systems dynamic analysis
[AD-A067549] N79-27129
DIGITAL TECHNIQUES
Etching of micropatterns over large areas using electron beam technology
[BMFT-FB-T-78-18] N79-27424
Activities of the Laboratory for Image Processing, 1978
[FOA-C-30159-E1] N79-27870
DILUTION
Dilute solution viscosity of water reducible acrylic resins
N79-27303
DIMENSIONS
On the existance of physical spaces with a dimensionality of N not equals 3 + 1
[PR-400] N79-28041
DIMERIZATION
Formation of dimers in rare gas beams from nozzles
[MPIS-5/1978] N79-27950
DIODES
Power converter --- for display devices, lighting equipment
[NASA-CASE-FRC-11014-1] N79-27395
DIOXIDES
Regional transport and photochemical model of atmospheric sulfates
N79-27575
The European regional model of air pollution [EURMAP] and its application to short term episodes
N79-27576
A climatology of meteorological parameters for short-range dispersion and long-range transport
N79-27577
A multi-scale dispersion model for local and regional sulfur dioxide/sulfate concentrations: Formulation and initial evaluation
N79-27578
Compilation and analysis of data sets for the evaluation of regional sulfate models
N79-27579
DIPHENYL COMPOUNDS
Diphenyl ether triple point cells
[NPL-CHEM-86] N79-27289
DIRECT CURRENT
A dc model for power switching transistors suitable for computer-aided design and analysis
[NASA-CR-158764] N79-27396
DIRECT POWER GENERATORS
Direct firing of coal for power production
N79-27612

DIRECTIONAL STABILITY
The directional stability of crack propagation
N79-27530
DIRICHLET PROBLEM
Stability of the coincidence set for the Signorini problem
N79-27889
DISASTERS
Satellite communications for disaster relief operations
[NASA-TM-79198] N79-27351
DISCONTINUITY
Shock formation from discontinuities in the derivatives of solutions of nonlinear hyperbolic systems
[AD-A059201] N79-27090
DISCRETE ADDRESS BEACON SYSTEM
Discrete Address Beacon System [DABS] Air Traffic Control Radar Beacon System [ATCRBS] interference analysis
[AD-A068565] N79-27119
The DABS calibration performance monitoring equipment
[AD-A069126] N79-27120
DISCRETE FUNCTIONS
On optimal discriminants between two classes of random variables in terms of the moments of their distributions
[AD-A068551] N79-27904
Indicial response invariance in discrete time variable systems
[FUB-42-1977] N79-27912
DISPERSING
The development of methods for predicting and measuring distribution patterns of aerial sprays
[NASA-CR-158787] N79-27092
Carbon fiber behavior in an enclosed volume
[NASA-CR-159076] N79-27718
DISPERSIONS
Short-term dispersion from tall stacks
N79-27567
Experiments with a Markov chain dispersion model applied to vertical dispersion in the surface layer
N79-27569
Representation of inter grid sources in pseudospectral dispersion models
N79-27572
Receptor grid selection in model evaluation studies to compensate for uncertainty in wind direction specification
N79-27592
Meteorological input data for the Vienna dispersion model
N79-27593
A comparison of surface diffusion of air pollutants over water and land [an artificial island in the North Sea]
[KNMI-WR-78-13] N79-27790
DISPLACEMENT MEASUREMENT
Displacement and strain measurement using focused image holography
N79-27528
DISPLAY DEVICES
An advanced cockpit instrumentation system: The coordinated cockpit display
[NASA-TM-78559] N79-27136
Application of color-coding in airborne tactical displays
[AD-A067558] N79-27137
Dense transparent ferroelectric ceramics for optical applications
[BMFT-FB-T-78-17] N79-27319
Power converter --- for display devices, lighting equipment
[NASA-CASE-FRC-11014-1] N79-27395
Magnetic particles display matrix-address demonstrator
[AD-A067642] N79-27481
DISSOCIATION
A vibrational bias mechanism for diatomic dissociation: Induction times. steady rates, and activation energies
N79-27255
IR laser induced dissociation of N2F4 and isomerization of CH3NC
[MPIS-12/1978] N79-27287
DISTANCE MEASURING EQUIPMENT
Theory and experiments on precision L-band DMF
[FUB-44-1977] N79-27124
DISTILLATION
Enthalpy measurement of coal-derived liquids
[FE-2035-12] N79-27282
DISTORTION
Adjustment of large geodetic networks using a method for general sparse matrices
[SER-A-87] N79-27760
DISTRIBUTING
Cargo Logistics Airlift Systems Study [CLASS]. Volume 3: Cross impact between the 1990 market and the air physical distribution systems, book 1
[NASA-CR-158914] N79-27112
DISTRIBUTION FUNCTIONS
Transverse momentum distributions in Drell-Yan processes
[ILL-[TH]-79-22] N79-27897
Characterizations of the exponential distributions by relevation type equations
[AD-A067542] N79-27898
DIURNAL VARIATIONS
On the diurnal variation of wind in Finland
[TR-17] N79-27769
Diurnal rainfall variability in northeast Brazil
[INPE-1487-RPE/033] N79-27774
Changes in the weather: An objective approach
[KNMI-WR-78-10] N79-27788
Solar and lunar daily variation at low latitudes during quiet and disturbed days
[INPE-1435-RPE/011] N79-28088
DOCUMENT STORAGE
Nondestructive testing information analysis center, 1978
[AD-A068669] N79-27525
SFS: A file system supporting Pascal files. Design and specification
[NPL-DNACS-88] N79-28053
DONOR MATERIALS
Hydrogen in germanium
[LBL-7996] N79-28030
DOWNWASH
Downstream laminar boundary layer with mass additions
N79-27442
DRILLING
North Stanley Polymer Demonstration Project
[BETC/RI-78/19] N79-27313
DROUGHT
Relationship of red and photographic infrared spectral radiances to alfalfa biomass, forage water content, percentage canopy cover, and severity of drought stress
[NASA-TM-80272] N79-27638
DRYING APPARATUS
Photovoltaic-powered irrigation experiments in the United States --- crop drying and irrigating in Nebraska
[COO-4094-28] N79-27673
DUCTILITY
Elevated temperature ductility of types 304 and 316 stainless steel
[CONF-781202-38] N79-27298
DUCTS
An experimental study of sound radiation from hyperboloidal inlet ducts
[NASA-TM-80109] N79-27931
DURABILITY
Flight service evaluation of Kevlar-49 epoxy composite panels in wide-bodied commercial transport aircraft
[NASA-CR-159071] N79-27246
DYE LASERS
Studies of discharge excited organic vapors for efficient laser emission
[AD-A067512] N79-27495
DYNAMIC LOADS
Dynamic pressure loads in the air induction system of the tornado fighter aircraft
N79-27168
Response of structures to dynamic loading
[AD-A068567] N79-27534
DYNAMIC MODELS
Strike-slip faulting: Models for deformation in a non-uniform crust
N79-27735
Kinetic models for irreversible processes on a lattice
N79-28011
DYNAMIC PRESSURE
Dynamic pressure loads in the air induction system of the tornado fighter aircraft
N79-27168
DYNAMIC RESPONSE
Aircraft hydraulic systems dynamic analysis
[AD-A067549] N79-27129
Determining the dynamic response due to an imbalance at the attachments of a motor on a pod --- caused by rotor blade loss
N79-27171
Response of a rocket motor to transve-se blast loading
[AD-A068464] N79-27239
Modeling passive solar buildings with hand calculations --- conferences
[LBL-8583] N79-27683
DYNAMIC STRUCTURAL ANALYSIS
Response of structures to dynamic loading
[AD-A068567] N79-27534

E

EAR
Functional connections of the central auditory nervous system: Thalamocortical corticothalamic and corticotectal connections of the AI, AII and AAF auditory cortical fields
N79-27839
EARTH ATMOSPHERE
Propagation of long radio waves in the earth's environment
N79-27393
EARTH CORE
Shape of the ocean surface and implications for the Earth's interior
N79-27804
EARTH CRUST
Strike-slip faulting: Models for deformation in a non-uniform crust
N79-27735
EARTH MANTLE
The effect of a moving lithospheric plate on convection in the Earth's mantle
N79-27736
EARTH RESOURCES
Application of the unit regional value concept to a study of the mineral resources of Australia
N79-27624
Classification of multispectral images of natural resources using table look-up approach and clustering
[INPE-1439-TDL/006] N79-27642
Re-examination of undiscovered oil resources in the United States
[DOE/EIA-0103/9] N79-27643
EARTHQUAKES
Reevaluation of modified Mercalli intensity scale for earthquakes using distance as determinant
[PB-294439/5] N79-27767
ECLIPSING BINARY STARS
Rapid photometry of cataclysmic variable stars
N79-28069
ECOLOGY
Study of mathematical models of mutation and selection in multi-locus systems
[COO-2472-04] N79-27908
ECONOMETRICS
Airfreight forecasting methodology and results
N79-27114
ECONOMIC ANALYSIS
Comparative economic assessment of ethanol from biomass
[HCP/ET-2854] N79-27335
Coal liquefaction: Report on a focus group discussion
[DOE/TIC-10039] N79-27339
Citizens' solar program: State reports on barriers and strategies to renewable energy development
[HCP/U6308-01] N79-27703
LLL Octopus network: Some lessons and future directions
[UCRL-81067] N79-27885
Analysis of costs and benefits in automated information systems
[FUB-45-1977] N79-28055
Midterm oil and gas supply modeling system methodology description
[DOE/EIA-0103/17] N79-28059
ECONOMIC FACTORS
Guidance Simulation Techniques
N79-27229
Solar Heating and Cooling Of Buildings [SHACOB] requirements definition and impact analysis
[EPRI-ER-808-VOL-1] N79-27687
Identification of social and economic difficulties associated with the introduction of solar energy devices
[BMFT-FB-T-78-47] N79-27712
EDDY CURRENTS
Eddy current probe gun
[TDB-312] N79-27416
EDUCATION
Planning nets: A representation for formalizing analogies and semantic models of procedural skills
[AD-A067907] N79-28050
EFFECTIVE PERCEIVED NOISE LEVELS
Computation of minimum noise aircraft landing trajectories
[NASA-CR-158931] N79-27929
EFFICIENCY
Thermodynamic methods for determining losses in hydraulic components: A survey
[NEL-657] N79-28042
EGYPT
Egypt as seen by LANDSAT
N79-27626
EJECTORS
General introductory remarks. A: Noise from fluid ejectors. B: Pressure fluctuations generated in a circuit by flow singularities. C: Use of correlation technique to noise source detection problem
N79-27512
ELASTIC MEDIA
Wave propagation in anelastic media with applications to seismology
N79-27734
ELASTIC PROPERTIES
Improvement of hang glider performance by use of ultralight elastic wing
N79-27082
Introduction to composite materials. Volume 1: Deformation of unidirectional and laminated composites
[AD-A067544] N79-27248

ELASTIC SCATTERING
Physical processes in positron scattering at metal surfaces
N79-28021

ELASTIC WAVES
Ion implantation and its effects on the propagation of elastic surface waves
[LCR-494-305] N79-27368

ELASTOMERS
Compatibility of elastomers in alternate jet fuels
[NASA-CR-158773] N79-27321
Modeling of polymer networks for application to solid propellant formulating
[NASA-CR-158788] N79-27326

ELECTRIC BATTERIES
Demands and effects of solar technology on electric power storage
[AED-CONF-78-155-047] N79-27678

ELECTRIC BRIDGES
Power converter --- for display devices, lighting equipment
[NASA-CASE-FRC-11014-1] N79-27395

ELECTRIC CONTACTS
Pressure contact use on high-power semiconductor devices free of thermal fatigue
[BMFT-FB-T-78-02] N79-27418

ELECTRIC DISCHARGES
Crossed-field closing switch development
[AD-A068185] N79-27407
High power electric discharge laser
N79-27492
Studies of discharge excited organic vapors for efficient laser emission
[AD-A067512] N79-27495

ELECTRIC FIELD STRENGTH
High pressure arcs in SF6. Part 4: Field strength measurements in blown SF6-arcs
[BMT-FB-T-78-06-PT-4] N79-27422
Dissolution processes of aluminum oxide on tungsten, iridium, molybdenum, tantalum, and rhenium as a function of electric field strength
N79-28013

ELECTRIC FIELDS
Some observable properties of crystalline electrons in magnetic fields: Exact results in model crystals
N79-28018

ELECTRIC HYBRID VEHICLES
Commercialization focus group interview: Electric/hybrid vehicles
[DOE/TIC-10008] N79-28064

ELECTRIC POWER PLANTS
The ratio of peak 1-hour average concentrations to peak concentrations of other averaging times for various pollutants and differing sources
N79-27582
Air monitoring network design for power plant siting
N79-27590
Status of NO sub x control for coal-fired power plants
N79-27609
Economic considerations in coverting from oil/gas firing to coal
N79-27611
Direct firing of coal for power production
N79-27612
The Texaco coal gasification process for manufacture of medium BTU gas
N79-27614
The effects of regional insolation differences upon advanced solar thermal electric power plant performance and energy costs
[NASA-CR-158768] N79-27660
Locational response to regulatory policy: A regional analysis of energy facility location --- conferences
[BNL-23597] N79-27695
Advanced technology fuel cell program --- molten carbonate and phosphoric acid fuel cells and coal utilization in power plants
[EPRI-EM-956] N79-27702

ELECTRIC POWER TRANSMISSION
Assessment of load management on the electric power system --- conferences
[CONF-781182-3] N79-27412

ELECTRIC PROPULSION
Environmental assessment for the electric hybrid vehicle demonstration project, performance standards and financial incentives
[ANL/EES/TM-22] N79-27720

ELECTRICAL ENGINEERING
Design guidelines for large photovoltaic arrays
[SAND-79-7001] N79-27698

ELECTRICAL INSULATION
Basic research into the long duration behavior of insulating materials in SF6: Insulated transmission lines.
[BMFT-FB-T-78-09] N79-27423

ELECTRICAL PROPERTIES
Analytical study on the ideal response of normal-mode shock-depoled PZT ferroelectric ceramics with resistive, capacities, and inductive loads
[AD-A068552] N79-27312
Electrical characterization of 16K dynamic rams
[AD-A067713] N79-27867

ELECTRICAL RESISTIVITY
Electrical group impedance measurements in the United States between 200 and 415 kHz
[AD-A068088] N79-27352
A study of the conduction mechanisms in thin polymeric films with an application to the passivation of semiconductor components
N79-27399

ELECTRICITY
Using coal inside California for electric power
N79-27598
Electric energy demand and supply prospects for California
N79-27601
Direct firing of coal for power production
N79-27612
Proceedings of the Distribution Automation and Control Working Group. Volume 2: Proceedings
[NASA-CR-158769] N79-27659

ELECTRO-OPTICS
Research in millimeter wave techniques
[NASA-CR-158785] N79-27350
Development of opto-electronic methods for the investigation of the optical and mechanical parameters of transparent materials
N79-27974
Photo-electro-optical reproduction technology survey
[AD-A067534] N79-27977

ELECTROCATALYSTS
Bibliographical study of electrocatalysis involving mixed oxide compounds in an alkaline medium
[P/539/77/20] N79-27284

ELECTROCHEMICAL CELLS
Field effect ion selectivity, part 1. Electrochemical noise, part 2
N79-27270

ELECTROCHEMICAL CORROSION
Effect of silicate ions on electrode overvoltage
[P/539/77/24] N79-27413

ELECTROCHEMISTRY
Electrochemical fluorination of trichloroethylene and N, N-dimethyltrifluoroacetamide
[NASA-TM-79188] N79-27242
Theory of interfacial and charge transport phenomena in membrane electrochemistry
N79-27272
Electrochemical apparatus for analyzing carbon monoxide, hydrogen sulfide, hydrogen and sulfur dioxide
[BMFT-FB-T-78-08] N79-27729

ELECTRODES
Effect of silicate ions on electrode overvoltage
[P/539/77/24] N79-27413
High pressure arcs in SF6. Part 1: Formation and velocity distribution of vapor jets at the electrodes
[BMFT-FB-T-78-03-PT-1] N79-27419

ELECTROLYTE METABOLISM
Simulation of fluid-electrolyte metabolism as a means of preventing orthostatic instability in the crew of the second expedition aboard the Salyut-4 station
N79-27819

ELECTROLYTIC CELLS
Bibliographical study of electrocatalysis involving mixed oxide compounds in an alkaline medium
[P/539/77/20] N79-27284

ELECTROMAGNETIC ABSORPTION
Laser modulation of optical absorption in ZnSe
[NASA-CR-158789] N79-27976
The growth of density fluctuations in a finite sized inhomogeneous plasma
N79-27992

ELECTROMAGNETIC FIELDS
Research in space physics at the University of Iowa
[NASA-CR-158782] N79-28065

ELECTROMAGNETIC INTERACTIONS
SU{3} gauge theories of weak and electromagnetic interactions and strong interaction symmetry breaking
N79-27347

ELECTROMAGNETIC MEASUREMENT
Computer controlled near field measurements for testing steerable array antennas
[FFM-263] N79-27372

ELECTROMAGNETIC RADIATION
Multiple band circularly polarized antenna
[NASA-CASE-MSC-18334-1] N79-27348
The transfer of electromagnetic radiation in the turbulent atmosphere
N79-27389
Research activities of the Radiation Laboratory
[ISS-R-78/6] N79-27954

ELECTROMAGNETIC SCATTERING
Electromagnetic scattering by two-dimensional inhomogeneity due to an oscillating magnetic dipole
N79-27346

ELECTROMAGNETIC WAVE FILTERS
The nonreciprocal directional filter, a multipurpose ferrite device
[INPE-1448-RPE/013] N79-27402

ELECTROMAGNETIC WAVE TRANSMISSION
Electromagnetic waves in free space
[INPR-1475-RPE/026] N79-27353

ELECTROMAGNETISM
Research in millimeter wave techniques
[NASA-CR-158785] N79-27350

ELECTRON BEAMS
Etching of micropatterns over large areas using electron beam technology
[BMFT-FB-T-78-18] N79-27424

ELECTRON CYCLOTRON HEATING
ELMO Bumpy Torus. Alternate concepts development program
[CONF-7810127-1] N79-27999

ELECTRON DISTRIBUTION
A theory of local and global processes which affect solar wind electrons. 2: Experimental support
[NASA-TM-79628] N79-28109

ELECTRON FLUX DENSITY
Energetic electron fluxes in the earth's outer magnetosphere according to observations from the Prognoz-3 station
[PR-415] N79-27763

ELECTRON GUNS
Design of high-perveance confined-flow guns for periodic-permanent-magnet-focused tubes
[NASA-TP-1485] N79-27400

ELECTRON ORBITALS
Piecewise polynomial configuration interaction natural orbital study of 1s2 helium
N79-27259

ELECTRON PARAMAGNETIC RESONANCE
High-resolution EPR and piezospectroscopy studies of the lithium-oxygen donor in germanium
[LBL-8429] N79-27283
ESR studies on different pathological states
[ISS-L-22/9] N79-27854
Computer controlled ESR
[AD-A068164] N79-27868

ELECTRON SCATTERING
Exchange perturbation theories applied to electron-hydrogen atom scattering
N79-27942

ELECTRON STATES
Search for low-lying triplet electronic states
[AD-A068465] N79-28028
Hydrogen diffusion and electronic structure parameters in tantalum hydrides determined by pulsed NMR measurements
[IS-M-178] N79-28029

ELECTRON TRANSFER
Intervalence electron transfer in mixed-valence compounds
N79-27262
Chemiluminescence of dimethyldioxetane: Unimolecular generation of excited singlet and triplet acetone. Chemically initiated electron-exchange luminescence, the primary light generating reaction
[AD-A068920] N79-27281

ELECTRON TUNNELING
Interface and electron tunneling properties of thin oxides on silicon
N79-28023

ELECTRONIC COUNTERMEASURES
The error distribution for monopulse direction finding involving several sources
[FFM-267] N79-27123
ECCM: Performance of radar signal design
[REPT-5-78] N79-27370

ELECTRONIC EQUIPMENT
Electronic components for high speed signal processing in fiber optical communication
[BMFT-FB-T-77-75] N79-27383

ELECTRONIC EQUIPMENT TESTS
Decommutator patchboard verifier
[NASA-CASE-KSC-11065-1] N79-27865

ELECTRONIC TRANSDUCERS
The application of ion convection to the development of an electronic spirometer
N79-27477

ELECTRONS
Some observable properties of crystalline electrons in magnetic fields: Exact results in model crystals
N79-28018

ELECTROPHORESIS
Preparation of guinea pig macrophage for electrophoretic experiments in space
[NASA-CR-158777] N79-27814

ELECTROPHOTOMETERS
Application of curve-fitting to X-ray photoelectron spectroscopy and cyclic voltammetry
N79-27265
The 10 February 1977 lunar occultation of Uranus. Radius, limb darkening, and polar brightening at 6900 A
[NASA-CR-158780] N79-28074

ELECTROPHOTOMETRY
Cape York: The extraordinary mineralogy of an ordinary iron meteorite and its implication for the genesis of III AB irons
N79-28099

ELECTROPHYSICS
Theory of interfacial and charge transport phenomena in membrane electrochemistry
N79-27272

ELECTROSTATIC CHARGE
The capacitance of discs of arbitrary shape
[AD-A067758] N79-27928

ELECTROSTATIC PRECIPITATORS
Economic comparison of fabric filters and electrostatic precipitators for particulate control on coal-fired utility boilers
N79-27610

ELEMENTARY PARTICLE INTERACTIONS
Determination of NYK coupling constants by the Haber-Schaim method
[REPT-87] N79-27953

ELEVATORS [CONTROL SURFACES]
A general method for the layout of ailerons and elevators of gliders and motorplanes
N79-27076

ELLIPTIC DIFFERENTIAL EQUATIONS
Experiments with iterative methods for solving the discrete Poisson equation
[KNMI-WR-79-1] N79-27914

EMERGENCIES
Standard operating procedures, water immersion facility, revision B
[NASA-CR-160257] N79-27199

EMISSION SPECTRA
An EUV study of impurities in the Alcator A tokamak
N79-27996

EMISSIVITY
A model for the microwave emissivity of the ocean's surface as a function of wind speed
[NASA-TM-80278] N79-27640

ENERGETIC PARTICLES
Research in space physics at the University of Iowa
[NASA-CR-158782] N79-28065

ENERGY CONSERVATION
Diesel organic rankine cycle compound engine [Bottoming Cycle] program plan
[DOE/CS-0052] N79-27521
Energy and cost saving results for advanced technology systems from the Cogeneration Technology Alternatives Study [CTAS]
[NASA-TM-79213] N79-27665
Computer software for planning design of community energy systems
[CONF-781182-2] N79-28063

ENERGY CONSUMPTION
Assessment of load management on the electric power system --- conferences
[CONF-781182-3] N79-27412
Using coal inside California for nonelectric applications
N79-27599
Electric energy demand and supply prospects for California
N79-27601
A review of energy models. Part 4: July 1978
[IIASA-RR-78-11-PT-4] N79-27652

ENERGY CONVERSION
The Texaco coal gasification process for manufacture of medium BTU gas
N79-27614
Synthetic natural gas in California: When and why --- from coal
N79-27615
Status report the SRC-1 and SRC-2 processes
N79-27616
The H-Coal processes: A status report
N79-27617
EXXON donor solvent coal liquefaction process
N79-27618
Methanol from coal
N79-27619
Proceedings of the Distribution Automation and Control Working Group. Volume 2: Proceedings
[NASA-CR-158769] N79-27659
Energy-state formulation of lumped volume dynamic equations with application to a simplified free piston Stirling engine
[NASA-TM-79197] N79-27663
Energy and cost saving results for advanced technology systems from the Cogeneration Technology Alternatives Study [CTAS]
[NASA-TM-79213] N79-27665
Coal energy conversion options for Navy bases
[AD-A067463] N79-27667
Design development and implementation of data acquisition systems for photovoltaic tests and applications project
[COO-4094-24] N79-27672

ENERGY CONVERSION EFFICIENCY
Energy efficient aircraft engines
[NASA-TM-79204] N79-27141
Photovoltaic-powered irrigation experiments in the United States --- crop drying and irrigating in Nebraska
[COO-4094-28] N79-27673
A 10-kilowatt photovoltaic concentrator array
[SAND-78-7024] N79-27699
Market assessment of fuel cell total energy systems
[ORNL/CON-36] N79-27704

ENERGY DISSIPATION
Description of the possibilities for energy savings during the design and construction of apertures in buildings [cross-section report]
[BMFT-FB-T-78-15] N79-27345
Langmuir turbulence and dissipation of high frequency energy
[PR-353] N79-28007

ENERGY LEVELS
Introduction to physics of gas lasers
N79-27490

ENERGY POLICY
Enthalpy measurement of coal-derived liquids
[FE-2035-12] N79-27282
Investigation of gasification of biomass in the presence of catalysts
[CONF-7809125-1] N79-27327
Coal gasification, commercial concepts, gas cost guidelines, revision 1
[FE-2240-100] N79-27331
Methane production from beef cattle feedlots
[CONF-7806107-2] N79-27333
Investigation of flow phenomena in pulverized coal gasification for the new process
[BMFT-FB-T-78-27] N79-27341
Description of the possibilities for energy savings during the design and construction of apertures in buildings [cross-section report]
[BMFT-FB-T-78-15] N79-27345
Diesel organic rankine cycle compound engine [Bottoming Cycle] program plan
[DOE/CS-0052] N79-27521
On fossil fuel reserves and resources
[IIASA-RM-78-35] N79-27628
Re-examination of undiscovered oil resources in the United States
[DOE/EIA-0103/9] N79-27643
Energy: A continuing bibliography with indexes, issue 21
[NASA-SP-7043[21]] N79-27647
A review of energy models. Part 4: July 1978
[IIASA-RR-78-11-PT-4] N79-27652
The comparison and coordination of national policies and programs in the energy research and development sector
[EUR-5911] N79-27653
Performance prediction evaluation of ceramic materials in point-focusing solar receivers
[NASA-CR-158774] N79-27654
The effects of regional insolation differences upon advanced solar thermal electric power plant performance and energy costs
[NASA-CR-158768] N79-27660
Solar energy system installed at Mount Rushmore National Visitor Center in Keystone, South Dakota
[NASA-CR-161238] N79-27661
Energy and cost saving results for advanced technology systems from the Cogeneration Technology Alternatives Study [CTAS]
[NASA-TM-79213] N79-27665
Environmental readiness document. Solar: Hot water and passive, commercialization phase 3 planning
[DOE/ERD-0010] N79-27690
Impacts of new energy technologies as measured against reference energy systems --- conferences
[BNL-25475] N79-27694
Locational response to regulatory policy: A regional analysis of energy facility location --- conferences
[BNL-23597] N79-27695
Federal photovoltaic utilization program. Planning resource document
[HCP/M50081-01] N79-27706
Identification of social and economic difficulties associated with the introduction of solar energy devices
[BMFT-FB-T-78-47] N79-27712

ENERGY REQUIREMENTS
Electric energy demand and supply prospects for California
N79-27601
Coal's role in California's energy needs
N79-27602
Energy supply and demand in California
N79-27603
Coal supply for California
N79-27607
A review of energy models. Part 4: July 1978
[IIASA-RR-78-11-PT-4] N79-27652
Underground storage of natural gas by interstate pipeline companies for 1976 and winter 1976 - 1977
[DOE/EIA-0151] N79-27684
Comprehensive areal model of residential heating demands
[BNL-24998] N79-27692

ENERGY SPECTRA
A theory for portions of the energy spectrum and for intermittency of fine-scale turbulence
[AD-A068743] N79-27466

ENERGY STORAGE
Geologic assessment of compressed air storage sites in Kansas
[EPRI-EM-877] N79-27689
Performance of a hydraulic air compressor for use in compressed air energy storage power systems --- Conferences
[CONF-781202-27] N79-27693

ENERGY TECHNOLOGY
Methane production from beef cattle feedlots
[CONF-7806107-2] N79-27333
Proceedings of the Conference on Coal Use for California
[NASA-CR-158770] N79-27597
Energy: A continuing bibliography with indexes, issue 21
[NASA-SP-7043[21]] N79-27647
Proceedings of the Distribution Automation and Control Working Group. Volume 2: Proceedings
[NASA-CR-158769] N79-27659
Solar energy system installed at Mount Rushmore National Visitor Center in Keystone, South Dakota
[NASA-CR-161238] N79-27661
Energy and cost saving results for advanced technology systems from the Cogeneration Technology Alternatives Study [CTAS]
[NASA-TM-79213] N79-27665
Photovoltaic-powered irrigation experiments in the United States --- crop drying and irrigating in Nebraska
[COO-4094-28] N79-27673
Environmental readiness document. Small scale low head hydro: Commercialization, phase 3 planning
[DOE/ERD-0009] N79-27686
Environmental readiness document. Solar: Hot water and passive, commercialization phase 3 planning
[DOE/ERD-0010] N79-27690
Grip-connected integrated community energy system. Phase 2: Detailed feasibility and preliminary design, stage 2
[COO-4337-2/2] N79-27701
Citizens' solar program: State reports on barriers and strategies to renewable energy development
[HCP/U6308-01] N79-27703
Energy-related air quality monitoring in the western energy resource development area
[PB-293160/8] N79-27730
Alternative, semi-automated method for performing multiobjective analyses
[BNL-50892] N79-27921
Review of selected solar market studies and techniques
[SERI/PR-52-076] N79-28056

ENERGY TRANSFER
Energy transfer in anisotropic systems. A: Exciton migration in substitutionally disordered one-dimensional solids. B: The spectroscopy of molecules adsorbed on metal surfaces
N79-28010

ENGINE CONTROL
Analysis and preliminary design of optical sensors for propulsion control --- temperature sensors
[NASA-CR-159519] N79-27975

ENGINE DESIGN
Engine performance considerations for the large subsonic transport
N79-27139
Aircraft engine design using experimental stress analysis techniques
N79-27151
Stirling Engines
[VKI-LECTURE-SERIES-53] N79-27502
Stirling engines
N79-27503
Development of a low cost heavy/medium duty automotive Stirling engine
N79-27506
Degrees of freedom in the layout of Stirling engines
N79-27507
Unique requirements for the cooperation of computation and design in the development of Stirling engines
N79-27508

ENGINE FAILURE
The integrity of aircraft jet engines under the impact of foreign bodies
N79-27174

ENGINE INLETS
Ultrasonic inspection of engine nacelle structure searching for cracks
[REPT-7610.909] N79-27522

ENGINE PARTS
A contribution on thermal fatigue in cooled turbine blading
N79-27153
Forecasting engine life
N79-27154
Application of engine usage analysis to component life utilization
N79-27160
Boundary-integral equation analysis of an advanced turbine disk rim slot
N79-27161
Engine rotor burst containment/control studies
N79-27162
Small turbines: Experiences with disk ruptures
N79-27163

ENGINE TESTS
A new facility for structural engine testing
N79-27173

ENGINES
Stirling Engines
[VKI-LECTURE-SERIES-53] N79-27502
Stirling engines
N79-27503

Advanced theory of the Stirling cycle digital simulation of regenerative engine operation
N79-27504
Prospects for heavy/medium duty automotive stirling engines
N79-27505
Development of a low cost heavy/medium duty automotive Stirling engine
N79-27506

ENTHALPY
Enthalpy measurement of coal-derived liquids
[FE-2035-12] N79-27282

ENTROPY
Maximum entropy spectral analysis in the spatial domain
[AD-A068558] N79-27364

ENVIRONMENT EFFECTS
Solvent Refined Coal (SRC) process: Environmental program. Volume 3: Pilot plant development work, part 5
[FE-0496-T8] N79-27329
Some remarks on the noise nuisances and the basis for future ECC regulations
N79-27513
Possible environamental effects of increased coal use in California
N79-27604
Waste management
[DPST-78-125-2] N79-27964

ENVIRONMENT MANAGEMENT
Research activities of the Radiation Laboratory
[ISS-R-78/6] N79-27954

ENVIRONMENTAL MONITORING
The design of air quality networks
N79-27580
Energy-related air quality monitoring in the western energy resource development area
[PB-293160/8] N79-27730

ENVIRONMENTAL TESTS
An evaluation of grease type ball bearing lubricants operating in various environments
[NASA-TM-78232] N79-27515
Test of concentrator solar array model for SEPS
[NASA-TM-78230] N79-27662
Endurance and soil accumulation testing of photovoltaic modules at various MIT/LL test sites
[COO-4094-23] N79-27671
Environmental assessment for the electric hybrid vehicle demonstration project, performance standards and financial incentives
[ANL/EES/TM-22] N79-27720

ENVIRONMENTS
The human micro-environment
N79-27851

ENZYME ACTIVITY
Tissular metabolism in mixed type fibers of rat skeletal muscles after flight aboard Cosmos-690 biosatellite
N79-27823

ENZYMES
New instrumental, mathematical, and chemical developments for kinetic methods of analysis
N79-27267
Catecholamines snd enzymes of metabolism thereof in the rat hypothalamus after flight aboard Cosmos-782 biosatellite
N79-27822

EPITAXY
The use of molecular sprays in ultrahigh vacuum for GaAs monocrystalline growth applications
[LCR-2251-DK-PT-1] N79-28031

EPOXY RESINS
Flight service evaluation of Kevlar-49 epoxy composite panels in wide-bodied commercial transport aircraft
[NASA-CR-159071] N79-27246
Nonmetallic materials handbook. Volume 1: Epoxy materials
[NASA-CR-3133] N79-27307
Basic research into the long duration behavior of insulating materials in SF6: Insulated transmission lines.
[BMFT-FB-T-78-09] N79-27423

EQUATIONS OF MOTION
Theory of hole transport in rare gas solids
N79-28022

EQUATIONS OF STATE
A numerical fluid dynamics calculation method for all flow speeds
N79-27454
Space and time solution for two coupled intensity deviations from a stationary nonlinear state
N79-28004

EQUATORS
Influence of northern and southern hemisphere sq current systems on the equatorial region
[INPE-1434-RPE/010] N79-27747
On the generation of 3 meter irregularities during equatorial spread F by low frequency drift waves
[AD-A068580] N79-27754

EQUIPMENT SPECIFICATIONS
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160271] N79-27349

EROSION
Adhesive material transfer in the erosion of an aluminum alloy
[NASA-TM-79165] N79-27306

ERROR ANALYSIS
The influence of error introduced by thermal stable thermodynamic and kinetic reaction variables on the solution of equations for two-dimensional laminar hypersonic boundary layers
[KU-RZ-10/1977] N79-27105
The error distribution for monopulse direction finding involving several sources
[FFM-267] N79-27123
Surface wind analysis overland in the Netherlands, based on an optimum interpolation method
[KNMI-WR-78-17] N79-27797
A study of sampling schemes for Fourier transform reconstruction with an error analysis
N79-27892

ERROR CORRECTING CODES
Arithmetic codes
[AD-A067579] N79-27899

ESTERS
Search for low-lying triplet electronic states
[AD-A068465] N79-28028

ESTIMATING
Validation of CRSTER model air quality estimates for an industrial plant
N79-27583
The application of a mathematical model to the estimation of the concentrations of pollutants in European cities
N79-27586
Estimating air pollution frequency distributions
[KNMI-WR-78-16] N79-27728
Estimation of the geopotential coefficients
[INPE-1427-RPE/006] N79-27749
Magnitude estimation as a hearing aid selection procedure
N79-27838

ESTUARIES
A biogeochemical study of manganese in the estuarine zone
N79-27805

ETCHING
Monolithic 20w 2GHz transistor and monolithic 5w 4GHz transistor
[AD-A068165] N79-27408

ETHYL ALCOHOL
Comparative economic assessment of ethanol from biomass
[HCP/ET-2854] N79-27335
Material and energy balances in the production of ethanol from wood --- conferences
[CONF-7806139-1] N79-27338

EUROPE
The European regional model of air pollution (EURMAP) and its application to short term episodes
N79-27576
The comparison and coordination of national policies and programs in the energy research and development sector
[EUR-5911] N79-27653
Proposal for a modification of SPICA
[REPT-78-112] N79-28006
European sponsored astronomical research activities
[AR-1977] N79-28080

EUROPEAN SPACE PROGRAMS
Feasibility of large orbital antennas
[DFH/DSP-032/78-VOL-2] N79-27377
Design concept and feasibility study of a flexible deployable, solar panel generator used on a teledetection satellite
[S-1267-CA/81-VOL-1] N79-27708

EUTROPHICATION
A biogeochemical study of manganese in the estuarine zone
N79-27805

EVALUATION
ECCM: Performance of radar signal design
[REPT-5-78] N79-27370
Shalit Perceptual Organisation and Reduction Questionnaire (SPORQ): The instrument, design, administration and scoring
[FOA-C-55021-H6] N79-27859

EVAPOTRANSPIRATION
The Tergra model: A mathematical model for the simulation of the daily behavior of crop surface temperature and actual evapotranspiration
[REPT-1014] N79-27645

EXAMINATION
Shalit Perceptual Organisation and Reduction Questionnaire (SPORQ): The instrument, design, administration and scoring
[FOA-C-55021-H6] N79-27859

EXCHANGING
Exchange perturbation theories applied to electron-hydrogen atom scattering
N79-27942

EXCITATION
Modal analysis of compressor blades by means of impulse excitation
N79-27165

EXCITONS
Energy transfer in anisotropic systems. A: Exciton migration in substitutionally disordered one-dimensional solids. B: The spectroscopy of molecules adsorbed on metal surfaces
N79-28010

EXCLUSION
Findings and views concerning the exemption of kerojet fuels from the mandatory petroleum allocation and price regulations
[DOE/ERA-0023] N79-28058

EXHAUST GASES
Solvent Refined Coal (SRC) process: Environmental program. Volume 3: Pilot plant development work, part 5
[FE-0496-T8] N79-27329
Studies of the Navy-ARPA Chemical Laser (NACL) exhaust
[AD-A068079] N79-27496
Mathematical micromodel for local diffusion of carbon monoxide from motor vehicles
N79-27587
Stability sensitivity of the climatological dispersion model: A practical examination --- using emission data from an industrial plant
N79-27588
Fluidized combustion of coal --- to limit SO2 and NOx emissions
N79-27613
Exhaust emissions characteristics of 5 aircraft piston engines
[AD-A069012] N79-27719

EXHAUST NOZZLES
Studies of the acoustic transmission characteristics of coaxial nozzles with inverted velocity profiles: Comprehensive data report --- nozzle transfer functions
[NASA-CR-159628] N79-27933

EXHAUST SYSTEMS
Acoustic silencers for inlet and exhaust of turbomachinery
N79-27514

EXISTENCE THEOREMS
Vincent's theorem in algebraic manipulation
N79-27890

EXOBIOLOGY
Space biology and aerospace medicine, v. 13, no. 3, 1979
[JPRS-73784] N79-27817

EXPERIMENTAL DESIGN
Effects of space environment on composites: An analytical study of critical experimental parameters
[NASA-CR-158767] N79-27244
Experimental study of bonding agents used in mechanical assemblies
[CETIM-1-2J-03-0] N79-27316
Design considerations for improved fluidic input servovalve performance
[AD-A068977] N79-27517
Two-thousand amp/hr primary lithiumthionylchloride cells: Test results
[FOA-C-30152-E5] N79-27710

EXPONENTIAL FUNCTIONS
Characterizations of the exponential distributions by relevation type equations
[AD-A067542] N79-27898

EXTERNAL STORES
Weapon/aircraft interactions
N79-27205

EXTRATERRESTRIAL RADIATION
Effects of space environment on composites: An analytical study of critical experimental parameters
[NASA-CR-158767] N79-27244
Extraterrestrial high energy neutrino fluxes
[NASA-TM-80304] N79-28116
Codification and decodification of the pulse amplitude originating from space radiation
[INPE-1430-NTE/146] N79-28117

EXTRAVEHICULAR ACTIVITY
Probability of caisson disease while wearing a space suit when exiting from a spacecraft with an atmosphere close to that of earth
N79-27826

EXTREMUM VALUES
The ratio of peak 1-hour average concentrations to peak concentrations of other averaging times for various pollutants and differing sources
N79-27582

EXTRUDING
Experimental investigation into the feasibility of an extruded wing
N79-27077

F

F REGION
On the generation of 3 meter irregularities during equatorial spread F by low frequency drift waves
[AD-A068580] N79-27754

F-14 AIRCRAFT
The computation of optimal aircraft trajectories
[RE-577] N79-27128

F-15 AIRCRAFT
The computation of optimal aircraft trajectories
[RE-577] N79-27128
F-15 flight simulator: Development and analysis of computer scoring algorithm
[AD-A067765] N79-27188
F-16 AIRCRAFT
F-16 reliability improvement warranty. Implementation and management plan
[AD-A068561] N79-27133
FACTOR ANALYSIS
Degrees of freedom in the layout of Stirling engines
N79-27507
FAIL-SAFE SYSTEMS
The requirement of damage tolerance. An analysis of damage tolerance requirements with specific reference to MIL-A-83444
[NLR-TR-77005-U] N79-27135
FAILURE ANALYSIS
Investigation into computing the distribution of fatigue life by Monte-Carlo methods
[LBF-FR-138] N79-27526
Collected practical data on fatigue life research. On the interpretation of fatigue tests under combined constraints
[CETIM-1-1D-01-0] N79-27540
FANS
Performance of two-stage fan having low-aspect-ratio first-stage rotor blading
[NASA-TP-1493] N79-27143
FAR ULTRAVIOLET RADIATION
Measurement of the spectral sensitivity of radiation detectors and detector systems in the vacuumultraviolet spectral range by using a wall stabilized Ar cascade arc according to Boldt as a standard radiator
[MPI-PAE/EXTRATERR-142] N79-27968
FASTENERS
Bolted Joint Fatigue Programme. Volume 1: Stage 1, sections 1 to 6
[S/T-MEMO-1/77-VOL-1] N79-27536
Bolted Joint Fatigue Programme. Volume 2: Stage 1, appendices A, B, and C
[S/T-MEMO-1/77-VOL-2] N79-27537
Bolted Joint Fatigue Programme. Volume 3: Stage 2, supplementary investigations 1 to 6
[S/T-MEMO-1/77-VOL-3] N79-27538
Bolted Joint Fatigue programme. Volume 4: Stage 2, supplementary investigations 7 to 9
[S/T-MEMO-1/77-VOL-4] N79-27539
FATIGUE [MATERIALS]
Study of two heat resistant nickel alloys for turbomachine plates
[REPT-20-393] N79-27147
Collected practical data on fatigue life research. On the interpretation of fatigue tests under combined constraints
[CETIM-1-1D-01-0] N79-27540
FATIGUE LIFE
Three-dimensional finite-element techniques for gas turbine blade life prediction
N79-27156
Application of engine usage analysis to component life utilization
N79-27160
Review of the AGARD S and M panel evaluation program of the NASA-Lewis SRP approach to high-temperature LCF life prediction
N79-27179
Effect of variances and manufacturing tolerances on the design strength and life of mechanically fastened composite joints
[AD-A069170] N79-27518
Investigation into computing the distribution of fatigue life by Monte-Carlo methods
[LBF-FR-138] N79-27526
Collected practical data on fatigue life research. On the interpretation of fatigue tests under combined constraints
[CETIM-1-1D-01-0] N79-27540
FATIGUE TESTS
Experimental and analytical study of fatigue damage in notched graphite/epoxy laminates
[NASA-TM-80121] N79-27245
Bolted Joint Fatigue Programme. Volume 1: Stage 1, sections 1 to 6
[S/T-MEMO-1/77-VOL-1] N79-27536
Bolted Joint Fatigue Programme. Volume 2: Stage 1, appendices A, B, and C
[S/T-MEMO-1/77-VOL-2] N79-27537
Bolted Joint Fatigue Programme. Volume 3: Stage 2, supplementary investigations 1 to 6
[S/T-MEMO-1/77-VOL-3] N79-27538
Bolted Joint Fatigue programme. Volume 4: Stage 2, supplementary investigations 7 to 9
[S/T-MEMO-1/77-VOL-4] N79-27539
FEASIBILITY ANALYSIS
Feasibility study for a satellite frequency modulated radio communication system
[ESA-CR[P]-1151-VOL-1] N79-27376
FEEDBACK
The influence of feedback on the aeroelastic behavior of tilt proprotor aircraft including the effects of fuselage motion
[NASA-CR-158778] N79-27125
FELDSPARS
Chemical interaction of aqueous solutions with epidote-feldspar mineral assemblages in geologic systems
N79-27741
FERMIONS
Fermion Hamiltonians with monopole and quadrupole pairing
[LA-UR-79-241] N79-27947
Propagation of fermions in [A sub 0]=0 gauge
N79-27957
FERRIMAGNETIC MATERIALS
In depth study of the magnetocrystalline anisotropy of polycrystalline ferrimagnetic oxides
[LCR-1437/77] N79-28032
FERRITES
The nonreciprocal directional filter, a multipurpose ferrite device
[INPE-1448-RPE/013] N79-27402
FERROELECTRICITY
Analytical study on the ideal response of normal-mode shock-depoled PZT ferroelectric ceramics with resistive, capacities, and inductive loads
[AD-A068552] N79-27312
Dense transparent ferroelectric ceramics for optical applications
[BMFT-FB-T-78-17] N79-27319
FIBER COMPOSITES
Fracture mechanisms in fibrous composites --- glass and carbon fiber reinforced plastics
[AD-A067965] N79-27247
FIBER OPTICS
A central multichannel coupler for connections between fiber optic bundles
[LCR-14077] N79-27369
Electronic components for high speed signal processing in fiber optical communication
[BMFT-FB-T-77-75] N79-27383
Analysis and preliminary design of optical sensors for propulsion control --- temperature sensors
[NASA-CR-159519] N79-27975
Aircraft fiber-optic interconnect systems project
[AD-A068366] N79-27978
Measurement of optical fibers attenuation by the reflectometric method: Experimental apparatus and attainable accuracy
[FUB-16-1977] N79-27985
Characteristics of low loss optical fibers obtained from commercially available dielectrics
[FUB-21-1977] N79-27986
Measurements of characteristic parameters of an optical fiber
[FUB-22-1977] N79-27987
FIELD EFFECT TRANSISTORS
Field effect ion selectivity, part 1. Electrochemical noise, part 2
N79-27270
FIELD THEORY [ALGEBRA]
Gauge field theories. Part 3: Renormalization
[COO-1545-245-PT-3] N79-27905
FIELD THEORY [PHYSICS]
Propagation of fermions in [A sub 0]=0 gauge
N79-27957
Globally baryon symmetric cosmology, GUT spontaneous symmetry breaking, and the structure of the universe
[NASA-TM-80306] N79-28090
Cosmological baryon number domain structure from symmetry-breaking in grand unified field theories
[NASA-TM-80281] N79-28091
FIGHTER AIRCRAFT
YF-17/ADEN system study
[NASA-CR-144882] N79-27126
Integration of an airframe with a turbofan and afterburner system
N79-27172
FILLERS
Foam-filled fiberglass radomes
[AD-A068672] N79-27249
FILM COOLING
Flow visualization of discrete-hole film cooling with spanwise injection over a cylinder
[NASA-TP-1491] N79-27142
FILM THICKNESS
Depth profiling of the magnetic hyperfine field in ultra-thin films of iron
N79-28020
FINITE DIFFERENCE THEORY
An exploratory study of a finite difference method for calculating unsteady transonic potential flow
[NASA-TM-80105] N79-27096
Mass-consistent wind field modeling: Finite difference vis-a-vis finite element
N79-27571
FINITE ELEMENT METHOD
Stress interpretation in the finite element method
N79-27155
Three-dimensional finite-element techniques for gas turbine blade life prediction
N79-27156
Calculation of stress concentrations in disc alveoles --- viscoplasticity of turbine disks
N79-27157
Experimental and analytical study of fatigue damage in notched graphite/epoxy laminates
[NASA-TM-80121] N79-27245
Numerical methods in fluid dynamics, introductory remarks
N79-27449
A split finite element algorithm for the compressible Navier-Stokes equations
N79-27463
Numerical and software requirements for general nonlinear finite element analysis
N79-27527
Stress-intensity factors for internal surface cracks in cylindrical pressure vessels
[NASA-TM-80073] N79-27532
Mass-consistent wind field modeling: Finite difference vis-a-vis finite element
N79-27571
Evaluation of three constitutive models for soils
[AD-A068222] N79-27755
Analysis of finite element methods for second order boundary value problems using mesh dependent norms
[AD-A068902] N79-27903
Generalized element method
[COO-2383-0055] N79-27906
FISSION PRODUCTS
Analysis of direct nuclear pumped noble gas lasers
N79-27487
FIXED WINGS
Summary of results for a twin-engine, low-wing airplane substructure crash impact condition analyzed with program KRASH
[AD-A069171] N79-27116
FLAME RETARDANTS
An evaluation of the reaction of cellulose with anhydrides/ammonia for the production of flame resistant cellulose derivatives
N79-27305
FLAMES
Combustion fundamentals
N79-27278
FLASHOVER
Surface flashover characteristics of alumina dielectric guide cathodes in an intense relativistic electron beam accelerator
N79-27955
FLAT PLATES
The solution of Navier-Stokes equations in the boundary layer
N79-27455
FLEXIBILITY
Study of a flexible solar array generator for a remote sensing satellite. Volume 1: Technical report
[ESS/SS-909-VOL-1] N79-27709
FLEXIBLE WINGS
Wind tunnel tests of four flexible wing ultralight gliders
N79-27084
FLIGHT CONTROL
Science and Technology of Low Speed and Motorless Flight. Third International Symposium
[NASA-CR-2085] N79-27070
Minimum altitude-loss soaring in a specified vertical wind distribution
N79-27071
A study of course deviations during cross-country soaring
N79-27072
On global optimal sailplane flight strategy
N79-27073
A Monte Carlo approach to competition strategy --- for maximum lift and airspeed
N79-27075
Effects of control system dynamics on fighter approach and landing longitudinal flying qualities, volume 1
[AD-A067550] N79-27183
Guidance Simulation Techniques
N79-27229
FLIGHT CREWS
Handbook on astronaut crew motion disturbances for control system design --- in skylab
[NASA-RP-1025] N79-27237
The effect of a reclined sitting position on psychomotor performance during exposure to high, sustained +Gsub z acceleration
[FPRC-1362] N79-27856
The effect of acceleration and seat back angle on performance of a reaction time task
[FPRC-1364] N79-27857
The influence of seat back angle on acceleration tolerance
[FPRC-1365] N79-27858
FLIGHT INSTRUMENTS
An advanced cockpit instrumentation system: The coordinated cockpit display
[NASA-TM-78559] N79-27136
FLIGHT MECHANICS
Missile Aerodynamics, volume 2
[VKI-LECTURE-SERIES-67-VOL-2] N79-27211

FLIGHT PATHS
A study of course deviations during cross-country soaring
N79-27072
On global optimal sailplane flight strategy
N79-27073
Computation of minimum noise aircraft landing trajectories
[NASA-CR-158931] N79-27929
FLIGHT SAFETY
Experimental study of the flight envelope and research of safety requirements for hang-gliders
N79-27083
FLIGHT SIMULATION
Sixty years of aeronautical research, 1917-1977 --- Langley Research Center
[NASA-EF-145] N79-27089
Guidance and control for tactical guided weapons with emphasis on simulation and testing
[AGARD-LS-101] N79-27225
FLIGHT SIMULATORS
F-15 flight simulator: Development and analysis of computer scoring algorithm
[AD-A067765] N79-27188
Description of the TC 125 aboard the Mercury simulator
[NASA-TM-75479] N79-27198
FLIGHT TESTS
A flight investigation of basic performance characteristics of a teetering-rotor attack helicopter
[NASA-TM-80112] N79-27097
Turbine engine altitude chamber and flight testing with liquid hydrogen
[NASA-TM-79196] N79-27140
Engineering flight tests of range meteorological sounding system radiosonde
[AD-A067430] N79-27200
Flight test of four ESTEC heat pipes as a part of the payload planner for launch on an ARIES rocket
[ESA-CR(P)-1146] N79-27222
Weapon delivery and its evaluation
N79-27227
FLORIDA
Receptor grid selection in model evaluation studies to compensate for uncertainty in wind direction specification
N79-27592
FLOW CHARACTERISTICS
Stability of coal-oil mixtures --- conferences
[CONF-7805152-1] N79-27332
Design of high-perveance confined-flow guns for periodic-permanent-magnet-focused tubes
[NASA-TP-1485] N79-27400
The rotating hydraulics of steady flow in open channels
N79-27428
Some flow characteristics of conventional and tapered high pressure drop simulated seals
[NASA-TM-79192] N79-27460
Characteristics of turbulence in the atmospheric boundary layer
[FOA-VOL-12-NO-2] N79-27793
The effect of an arbitrary topography on compressible, stably stratified, vertically sheared flow on the Beta plane
N79-27802
FLOW CHARTS
The specification of a decompilation methodology for data flow schema
N79-27871
FLOW DISTRIBUTION
Lee side flow field over slender delta wings of finite thickness
[ILR-23] N79-27103
Investigation of flow phenomena in pulverized coal gasification for the new process
[BMFT-FB-T-78-27] N79-27341
Flow through a furrowed channel. Part 1: Calculated flow patterns
[OUEL-1273/78] N79-27472
The effect of an arbitrary topography on compressible, stably stratified, vertically sheared flow on the Beta plane
N79-27802
FLOW EQUATIONS
Unsteady flows --- flow equations
N79-27431
The solution of Navier-Stokes equations in the boundary layer
N79-27455
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 1: Numerical aspects
N79-27458
FLOW GEOMETRY
Trailing edge noise data with comparison to theory
[NASA-TM-79208] N79-27930
FLOW MEASUREMENT
Earth winds, flow quality, and the minimum-protection inlet treatment for the NASA Ames 80- by 120-foot wind tunnel nonreturn circuit
[NASA-TM-78600] N79-27186
Experimental techniques for analyzing unsteady flow in revolving machinery
N79-27433
Pulsatile flow through an orifice
[PB-292194/8] N79-27475
Heat flow and heat production studies in North Dakota
N79-27649
Techniques of measurement
N79-27850
FLOW STABILITY
Study in a straight cascade wind tunnel of aeroelastic instabilities in compressors
N79-27178
Unsteady flow in turbomachines
N79-27432
FLOW VELOCITY
An examination of a group-velocity criterion for the breakdown of an idealized vortex flow
[NASA-TM-78541] N79-27436
A numerical fluid dynamics calculation method for all flow speeds
N79-27454
FLOW VISUALIZATION
Flow visualization of discrete-hole film cooling with spanwise injection over a cylinder
[NASA-TP-1491] N79-27142
FLOWMETERS
Automatic flowmeter calibration system
[NASA-CASE-KSC-11076-1] N79-27479
FLUID AMPLIFIERS
Design considerations for improved fluidic input servovalve performance
[AD-A068977] N79-27517
FLUID BOUNDARIES
Pressure on the interface between a converging fluid wedge and a fast fluid bottom
[AD-A067561] N79-27465
FLUID DYNAMICS
Design of shock-free transonic flow in turbomachinery
[AD-A067703] N79-27144
Combustion
[VKI-LECTURE-SERIES-22] N79-27276
The basic equations
N79-27277
Combustion fundamentals
N79-27278
Numerical Methods in Fluid Dynamics
[VKI-LECTURE-SERIES-44] N79-27448
Numerical methods in fluid dynamics, introductory remarks
N79-27449
The marker-and-cell method
N79-27451
The particle in-cell method
N79-27452
A Lagrangian method for calculating the dynamics of an incompressible fluid with free surface
N79-27453
A numerical fluid dynamics calculation method for all flow speeds
N79-27454
The solution of Navier-Stokes equations in the boundary layer
N79-27455
Pressure on the interface between a converging fluid wedge and a fast fluid bottom
[AD-A067561] N79-27465
Physiological fluid dynamics
[VKI-LECTURE-SERIES-32] N79-27843
Respiration
N79-27845
Mechanics of arterial blood flow
N79-27846
FLUID FLOW
Time dependent methods for multi-dimensional compressible flow problems
N79-27450
FLUID INJECTION
North Stanley Polymer Demonstration Project
[BETC/RI-78/19] N79-27313
FLUID MECHANICS
Unsteady Flows in Axial Flow Compressors
[VKI-LECTURE-SERIES-20] N79-27429
Unsteady flows --- flow equations
N79-27431
Unsteady flow in turbomachines
N79-27432
An examination of a group-velocity criterion for the breakdown of an idealized vortex flow
[NASA-TM-78541] N79-27436
FLUID PRESSURE
General introductory remarks. A: Noise from fluid ejectors. B: Pressure fluctuations generated in a circuit by flow singularities. C: Use of correlation technique to noise source detection problem
N79-27512
FLUIDICS
Analysis of wind tunnel test results of fluidic generator for high-altitude rocket
[AD-A069172] N79-27219
FLUIDIZED BED PROCESSORS
Evaluation of the flash desulfurization process for coal cleaning
[PB-292328/2] N79-27342
Fluidized combustion of coal --- to limit SO2 and NOx emissions
N79-27613
Reduction of particulate carryover from a pressurized fluidized bed
[NASA-TM-79216] N79-27664
FLUORESCENCE
Kinetics and magnetic field effects on laser induced fluorescence in NO2
N79-27256
Applications of chlorophyll fluorescence transient measurements to the functional analysis of photosynthetic processes
N79-27813
FLUORIDES
The oxidizing behavior of some platinum metal fluorides
N79-27261
The dependence of the piezoelectric response of poly[vinylidene] [vinylidene fluoride] on phase 1 volume fraction
[AD-A067961] N79-27310
FLUORINATION
Electrochemical fluorination of trichloroethylene and N, N-dimethyltrifluoroacetamide
[NASA-TM-79188] N79-27242
FLUORO COMPOUNDS
Electrochemical fluorination of trichloroethylene and N, N-dimethyltrifluoroacetamide
[NASA-TM-79188] N79-27242
FLUTTER
Treatment of the control mechanisms of light airplanes in the flutter clearance process
N79-27078
Stresses, vibrations, structural integration and engine integrity [including aeroelasticity and flutter]
[AGARD-CP-248] N79-27148
FLUTTER ANALYSIS
The analysis of engine vibrations
N79-27150
FLUX [RATE]
A plume dispersion study at Mildred Lake, Alberta
N79-27581
Extraterrestrial high energy neutrino fluxes
[NASA-TM-80304] N79-28116
FOAMS
Foam-filled fiberglass radomes
[AD-A068672] N79-27249
FOLDING STRUCTURES
Design concept and feasibility study of a flexible deployable, solar panel generator used on a teledetection satellite
[S-1267-CA/81-VOL-1] N79-27708
FORMALDEHYDE
Laser photochemical reaction dynamics in formaldehyde
N79-27274
FOSSIL FUELS
A climatology of meteorological parameters for short-range dispersion and long-range transport
N79-27577
A multi-scale dispersion model for local and regional sulfur dioxide/sulfate concentrations: Formulation and initial evaluation
N79-27578
On fossil fuel reserves and resources
[IIASA-RM-78-35] N79-27628
FOURIER ANALYSIS
Study of a method for filtering optical images
[BNWL-TR-343] N79-27979
FOURIER LAW
Construction and setting up of a lamellar grating with a very wide spectral range and its use as a Fourier spectrometer for astrophysical measurements on large molecules
[MPI-PAE/EXTRATERR-144] N79-27949
FOURIER TRANSFORMATION
A study of sampling schemes for Fourier transform reconstruction with an error analysis
N79-27892
FRACTIONATION
High performance N2O4/amine elements blowapart
[NASA-CR-160272] N79-27323
High performance N2O4/amine elements blowapart
[NASA-CR-160273] N79-27324
FRACTURE MECHANICS
Fracture mechanisms in fibrous composites --- glass and carbon fiber reinforced plastics
[AD-A067965] N79-27247
Steam turbine rotor reliability: Task details
[EPRI-NP-923] N79-27520
The numerical solution of singular integral equations and applications to mixed boundary value problems of fracture mechanics
N79-27529
Fault tolerant spaceborne computer study. Preprocessor design
[AD-A067693] N79-27866
Brassboard Fault Tolerant Spaceborne Computer [BFTSC], volume 1
[AD-A068553] N79-27869
FRACTURE STRENGTH
Fracture toughness of fabrication welds investigated by metallographic methods
[CONF-780732-5] N79-27295
FRACTURES [MATERIALS]
Stress-intensity factors for internal surface cracks in cylindrical pressure vessels
[NASA-TM-80073] N79-27532

FRAGMENTATION
Engine rotor burst containment/control studies
N79-27162
FRANCE
Amoco Cadiz: Preliminary observations of the oil spill impact on the marine environment --- conference proceedings, Brest, 7 Jun. 1978
[CNEXO-6-1978] N79-27726
FREE FLIGHT
Zero and superpressure free flight ballooning
[AWRE-0-61/78] N79-27111
FREE RADICALS
Research on elementary HO2 and OH radical reactions in the gas phase using laser magnetic resonance
[MPIS-10/1978] N79-27286
FREEZING
Reliability and maintainability evaluation of freezing in solar systems
[ANL/SDP/TM-78-3] N79-27674
FREQUENCY DISTRIBUTION
Estimating air pollution frequency distributions
[KNMI-WR-78-16] N79-27728
FREQUENCY STABILITY
Static and dynamic frequency: Temperature characteristics of quartz vibrators
[AD-A068630] N79-27409
FRESNEL LENSES
A 10-kilowatt photovoltaic concentrator array
[SAND-78-7024] N79-27699
FRICTION
Vibration of bearings
[NASA-TT-F-679] N79-27501
FRONTS [METEOROLOGY]
Thunderstorm gust fronts: Observations and modeling
[AD-A068425] N79-27773
FUEL CELLS
Advanced technology fuel cell program --- molten carbonate and phosphoric acid fuel cells and coal utilization in power plants
[EPRI-EM-956] N79-27702
Market assessment of fuel cell total energy systems
[ORNL/CON-36] N79-27704
FUEL CONSUMPTION
Energy efficient aircraft engines
[NASA-TM-79204] N79-27141
The 1980 motor gasoline supply and demand. Analysis memorandum AM/ES/79-12
[DOE/EIA-0102/32] N79-27337
Energy use and supply in the Lake Champlain Basin
[PB-293437/0] N79-27713
FUEL OILS
Re-examination of undiscovered oil resources in the United States
[DOE/EIA-0103/9] N79-27643
FUEL TANKS
Atlas 5013 tank corrosion test
[NASA-CR-158760] N79-27234
FUELS
Coal energy conversion options for Navy bases
[AD-A067463] N79-27667
FUNCTIONAL ANALYSIS
Applications of chlorophyll fluorescence transient measurements to the functional analysis of photosynthetic processes
N79-27813
The systemic principles of building a man-machine control staff --- functional analysis
N79-27861
FUNCTIONS [MATHEMATICS]
Calculation of functions of some particular matrices
[FUB-11-1977] N79-27926
FURNACES
Mixing and kinetic processes in pulverized coal combustors
[EPRI-FP-806-SY] N79-27330
FUSELAGES
Engine/aircraft structural integration: An overview
N79-27167
FUSION REACTORS
Bending free toroidal shells for tokamak fusion reactors with nonideal magnetic field distributions
[CONF-781202-36] N79-28001

G

GALACTIC RADIATION
Measurement of the isotopic composition of the iron group elements in the galactic cosmic radiation
N79-28113
GALAXIES
A study of the molecular complexes accompanying MON OB1 MON OB2 and CMA OB1
N79-28068
Photometry of a complete sample of faint galaxies
N79-28071
GALLIUM ARSENIDES
InP and GaAs surface characterization with variable stoichiometry obtained by molecular spray. Applications to the manufacture of Schottky diodes
[LCR-2270-DK] N79-27414
The use of molecular sprays in ultrahigh vacuum for GaAs monocrystalline growth applications
[LCR-2251-DK-PT-1] N79-28031
GAME THEORY
A bi-extremal principle for estimating efficiency frontier parameter values
[AD-A068992] N79-28046
GAMMA GLOBULIN
Investigation of albumin and globulin composition of blood of the crew of the Salyut-3 orbital station
N79-27820
GAMMA RAY ASTRONOMY
Topics in astrophysical X-ray and gamma ray spectroscopy
N79-28067
Background radiation in some recent high-resolution measurements in gamma-ray astronomy
[INPE-1474-RPE/025] N79-28076
GAMMA RAYS
Gamma-ray burst observations from Helios-2
[NASA-TM-80284] N79-28115
GAS ANALYSIS
Electrochemical apparatus for analyzing carbon monoxide, hydrogen sulfide, hydrogen and sulfur dioxide
[BMFT-FB-T-78-08] N79 27729
GAS CHROMATOGRAPHY
A systematic approach to open tubular column gas-chromatographic instrumentation
N79-27271
Multidimensional high resolution gas liquid chromatography in trace organic analysis: Heartcutting with intermediate trapping
N79-27273
GAS DYNAMICS
Study of the behavior of gas distribution equipment in hydrogen service update 1978
[CONF-781142-5] N79-27328
GAS FLOW
Study of the behavior of gas distribution equipment in hydrogen service update 1978
[CONF-781142-5] N79-27328
Respiration
N79-27845
GAS GUNS
Eddy current probe gun
[TDB-312] N79-27416
GAS INJECTION
Downstream laminar boundary layer with mass additions
N79-27442
GAS LASERS
Analysis of direct nuclear pumped noble gas lasers
N79-27487
High-power gas lasers, volume 1
[VKI-LECTURE-SERIES-65-VOL-1]
N79-27488
Gas dynamic lasers: Theory, experiment and the state-of-the-art
N79-27489
Introduction to physics of gas lasers
N79-27490
GAS MIXTURES
Derivation of the basic equations for non-equilibrium boundary layers
N79-27438
The numerical solution of the nonsimilar laminar boundary-layer equations including the effects of nonequilibrium dissociation
N79-27440
Helium-oxygen mixture and the organism hyperbaric aspect
N79-27818
GAS STREAMS
A three-dimensional model of co-rotating streams in the solar wind. 2: Hydrodynamic streams
[NASA-TM-80276] N79-28110
GAS TRANSPORT
Physiological fluid dynamics
[VKI-LECTURE-SERIES-32] N79-27843
GAS TURBINE ENGINES
Structural analysis of a gas turbine impeller using finite-element and holographic techniques
N79-27149
A contribution on thermal fatigue in cooled turbine blading
N79-27153
Three-dimensional finite-element techniques for gas turbine blade life prediction
N79-27156
Ceramic mainshaft roller bearing performance in a gas turbine engine
[AD-A067904] N79-27516
GAS TURBINES
Combustor design criteria validation. Volume 2: Development testing of two full-scale annular gas turbine combustors
[AD-A067689] N79-27145
Combustor design criteria validation. Volume 1: Element tests and model validation
[AD-A067657] N79-27146
The contribution of photoelasticity measurement to the study of turbine parts
N79-27152
An investigation of vibration dampers in gas-turbine engines
N79-27164
GAS-SOLID INTERFACES
Mechanistic studies in the organic solid state
N79-28008
GASDYNAMIC LASERS
High-power gas lasers, volume 1
[VKI-LECTURE-SERIES-65-VOL-1]
N79-27488
Gas dynamic lasers: Theory, experiment and the state-of-the-art
N79-27489
Introduction to physics of gas lasers
N79-27490
GASIFICATION
Investigation of gasification of biomass in the presence of catalysts
[CONF-7809125-1] N79-27327
GASOLINE
Alcohol fuels
[GPO-22-334] N79-27322
Coal gasification, commercial concepts, gas cost guidelines, revision 1
[FE-2240-100] N79-27331
The 1980 motor gasoline supply and demand. Analysis memorandum AM/ES/79-12
[DOE/EIA-0102/32] N79-27337
GAUGE INVARIANCE
SU[3] gauge theories of weak and electromagnetic interactions and strong interaction symmetry breaking
N79-27347
Gauge field theories. Part 3: Renormalization
[COO-1545-245-PT-3] N79-27905
Propagation of fermions in [A sub 0]=0 gauge
N79-27957
Gauge invariant perturbation theory in spatially homogeneous cosmology
N79-28086
GAUSS EQUATION
Tests of the climatological dispersion model and Gaussian Models at the Strait of Canso and at Lingan, Nova Scotia
N79-27584
Sensitivity of a Gaussian plume model to the vertical dispersion parameters
N79-27585
GENERAL AVIATION AIRCRAFT
Civil Aeronautics Board reports to Congress, fiscal year 1977 and transitional quarter
N79-27069
GEODESY
Geodetic applications of inertial navigational systems
[AD-A067179] N79-27121
Navigation and position determination
[FOA-A-20026-E3] N79-27122
Electromagnetic induction in a conducting plate with a charged vertical finite cylinder
[GAMMA-30] N79-27757
Adjustment of large geodetic networks using a method for general sparse matrices
[SER-A-87] N79-27760
GEODETIC SURVEYS
Time-dependent gravity in southern California, May 1974 - Apr 1979
[NASA-CR-158765] N79-27807
GEOIDS
Shape of the ocean surface and implications for the Earth's interior
N79-27804
GEOLOGICAL FAULTS
Strike-slip faulting: Models for deformation in a non-uniform crust
N79-27735
GEOLOGICAL SURVEYS
Geologic assessment of compressed air storage sites in Kansas
[EPRI-EM-877] N79-27689
Tectonic motion site survey of the National Radio Astronomy Observatory, Green Bank, West Virginia
[NASA-TM-79691] N79-27748
GEOLOGY
Apparatus for rapid and precise surface area measurements of unconsolidated geologic materials
[BETC/RI-78/8] N79-27756
Geology of the passive margin of New England
[PB-294473/4] N79-27768
Reports of planetary geology program, 1978 - 1979
[NASA-TM-80339] N79-28066
GEOMAGNETIC LATITUDE
Influence of northern and southern hemisphere sq current systems on the equatorial region
[INPE-1434-RPE/010] N79-27747
GEOMAGNETIC PULSATIONS
Referenced magnetotellurics with SQUIDS
N79-27742
GEOMAGNETIC TAIL
On the possibility of determining the Venus magnetic moment from magnetic measurements in the tail
[PR-432] N79-28105
GEOMAGNETISM
An introduction to the AFGL Magnetometer network
[AD-A068979] N79-27752
Electromagnetic induction in a conducting plate with a charged vertical finite cylinder
[GAMMA-30] N79-27757

Development of a low drift SQUID magnetometer for geophysical applications
[GAMMA-32] N79-27759
Spherical harmonic models of the geomagnetic field
[BULL-8] N79-27761
GEOPOTENTIAL
Fourteenth-order harmonics from analysis of mean longitude variations of resonant satellites
[TUM-MITT-132] N79-27223
Estimation of the geopotential coefficients
[INPE-1427-RPE/006] N79-27749
Transformations of spherical harmonics and applications to geodesy and satellite
[INPE-1453-RPE/018] N79-27895
GEOS SATELLITES [ESA]
Design, manufacturing, and testing of spacecraft thrust cone made of Carbon Fiber Reinforced Plastic [CFRP]
[EMSB-79/78] N79-27240
GEOSTROPHIC WIND
On the calculation of large scale vertical circulation using a three parameter quasigeostrophic numerical model
[KNMI-WR-78-12] N79-27789
GEOSYNCLINES
The Saltville thrust decollement: Deformation of Maccrady formation evaporites N79-27738
GEOTHERMAL ENERGY CONVERSION
Exploration of volcanic geothermal energy resources based on rheological techniques
[DOE/ET/28453-3] N79-27676
GEOTHERMAL RESOURCES
Prelimary results of tests of proprietary chemical additives, seeding, and other approaches for the reduction of scale in hypersaline geothermal systems
[UCID-18051] N79-27669
Sampling and analysis methods for geothermal fluids and gases
[PNL-MA-572-APP] N79-27679
Kinetics of silica deposition from simulated geothermal brines
[CONF-790108-1] N79-27691
GERMANIUM
High-resolution EPR and piezospectroscopy studies of the lithium-oxygen donor in germanium
[LBL-8429] N79-27283
Hydrogen in germanium
[LBL-7996] N79-28030
GERMANY
Wind tunnel measurements of dynamic derivatives in the German Federal Republic
[IFD-5-78] N79-27107
Room heat storage processes
[BMFT-FB-T-78-14] N79-27711
Identification of social and economic difficulties associated with the introduction of solar energy devices
[BMFT-FB-T-78-47] N79-27712
GLACIOLOGY
A study of the theoretical and practical determination of hydrogeological parameters in glacial outwash sands by surface geoelectrics N79-27733
GLASS
Transitions above the glass transition temperature in amorphous polymers N79-27299
Viscosity and electrical conductivity of glass melts as a function of waste composition
[DP-MS-78-80] N79-27314
Development of glass compositions for immobilization of SRP waste
[DP-1517] N79-27965
GLASS ELECTRODES
Apparatus and method of inserting a microelectrode in body tissue or the like using vibration means
[NASA-CASE-NPO-13910-1] N79-27836
GLASS FIBER REINFORCED PLASTICS
Fracture mechanisms in fibrous composites --- glass and carbon fiber reinforced plastics
[AD-A067965] N79-27247
GLASS FIBERS
Foam-filled fiberglass radomes
[AD-A068672] N79-27249
GLIDERS
Science and Technology of Low Speed and Motorless Flight, Third International Symposium
[NASA-CR-2085] N79-27070
Minimum altitude-loss soaring in a specified vertical wind distribution N79-27071
A study of course deviations during cross-country soaring N79-27072
On global optimal sailplane flight strategy N79-27073
Balance training of the equilibrium organ and its effect on flight strategy N79-27074
A Monte Carlo approach to competition strategy --- for maximum lift and airspeed N79-27075
A general method for the layout of ailerons and elevators of gliders and motorplanes N79-27076
Experimental investigation into the feasibility of an extruded wing N79-27077
Advanced composites in sailplane structures: Application and mechanical properties N79-27079
The ultralight sailplane N79-27080
Analytical and scale model research aimed at improved hangglider design N79-27081
Improvement of hang glider performance by use of ultralight elastic wing N79-27082
Experimental study of the flight envelope and research of safety requirements for hang-gliders N79-27083
Wind tunnel tests of four flexible wing ultralight gliders N79-27084
Contemporary soaring nomenclature N79-27085
An exploratory investigation of the effect of a plastic coating on the profile drag of a practical-metal-construction sailplane airfoil
[NASA-TM-80092] N79-27098
GLOBAL AIR POLLUTION
International operations handbook for measurement of background atmospheric pollution
[WMO-491] N79-27724
GLOBAL AIR SAMPLING PROGRAM
A summary of research on the NASA-Global Atmospheric Sampling Program performed by the Atmospheric Sciences Research Center --- ozone transport theory
[NASA-CR-159614] N79-27716
GLUCOSE
New instrumental, mathematical, and chemical developments for kinetic methods of analysis N79-27267
GLUES
Experimental study of bonding agents used in mechanical assemblies
[CETIM-1-2J-03-0] N79-27316
GLYCINE
A study of crystal growth by solution technique --- triglycine sulfate single crystals
[NASA-CR-158763] N79-28024
GOVERNMENT/INDUSTRY RELATIONS
Electric utilities and solar energy: The service contract in a new social context
[ORAU/IEA(O)-79-3] N79-27685
GOVERNMENTS
Federal Information Centers Act --- congressional reports
[H-REPT-95-1530] N79-28049
GRAINS
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629
GRAPHITE-EPOXY COMPOSITE MATERIALS
Effects of moisture on torsion and flexure properties of graphite-epoxy composites
[NASA-TM-78597] N79-27243
Experimental and analytical study of fatigue damage in notched graphite/epoxy laminates
[NASA-TM-80121] N79-27245
GRASSLANDS
Prairie grass revisited: Optimum indicators of vertical spread N79-27563
GRATINGS [SPECTRA]
Construction and setting up of a lamellar grating with a very wide spectral range and its use as a Fourier spectrometer for astrophysical measurements on large molecules
[MPI-PAE/EXTRATERR-144] N79-27949
GRAVITATION
Time-dependent gravity in southern California, May 1974 - Apr 1979
[NASA-CR-158765] N79-27807
GRAVITATIONAL FIELDS
Gravitational radiation and the ultimate speed in Rosen's Bimetric theory of gravity
[NASA-CR-158718] N79-27743
Estimation of the geopotential coefficients
[INPE-1427-RPE/006] N79-27749
GRAVITATIONAL WAVE ANTENNAS
The transfer function and Brownian noise of the gravitational antenna
[LPS-78-1] N79-27380
GRAVITATIONAL WAVES
Search for gravitational waves
[LPS-78-3] N79-27762
GRAVITY ANOMALIES
Studies in modeling, reduction and filtering of potential field data N79-27737
GRAVITY WAVES
A numerical model of acoustic fluctuations for single- and paired-path transmissions in real and canonical oceans N79-27801
GREASES
An evaluation of grease type ball bearing lubricants operating in various environments
[NASA-TM-78232] N79-27515
GREECE
Seismic stratigraphy and basin development, Nestos Delta area, northeastern Greece N79-27739
GRINDING [COMMINUTION]
Investigation of flow phenomena in pulverized coal gasification for the new process
[BMFT-FB-T-78-27] N79-27341
GROUND HANDLING
The 1990 direct support infrastructure N79-27115
GROUND WAVE PROPAGATION
HF channel simulator for wideband signals deviative absorption and groundwave attenuation in the HF channel, addendum 1
[AD-A067906] N79-27359
GROUND WIND
Surface wind analysis overland in the Netherlands, based on an optimum interpolation method
[KNMI-WR-78-17] N79-27797
GROUP THEORY
On rational approximations of groups of operators
[CTH-MATH-1978-10-1] N79-27911
GROWTH
Algal growth kinetics in bioconversion of solar energy N79-27650
The growth of density fluctuations in a finite sized inhomogeneous plasma N79-27992
GUIDANCE [MOTION]
Missile guidance techniques N79-27230
GUIDANCE SENSORS
Missile guidance techniques N79-27230
Testing of missile guidance and control systems N79-27231
GULF OF MEXICO
Statistical nature of cold fronts within the Gulf of Mexico and their potential influence on OTEC operations
[PNL-2878] N79-27786
GUST LOADS
Thunderstorm gust fronts: Observations and modeling
[AD-A068425] N79-27773

H

HADRONS
Quantum mechanics and quarkonium: An introductory review
[FERMILAB-CONF-78/82-THY] N79-28039
The hadron spectrum at ground level, part 1. The stability of the period of cygnus x-3, part 2 N79-28072
HAILSTORMS
Midtemperature Solar Systems Test Facility test results: Effects of severe hailstorm on 9 August 1978
[SAND-78-2182] N79-27680
HALF SPACES
Analysis of arbitrarily shaped wire antennas radiating over a lossy half-space
[AD-A068548] N79-27365
HALIDES
Measurement of transport properties of several N-alkylpyridinium halides and their mixtures with aluminum chloride
[AD-A067763] N79-27280
Dynamics of molecular photodissociation --- polyhalide molecules N79-27940
HALOGEN COMPOUNDS
Thermal rate constants, energy dependence and isotope effect for laser initiated halogen-hydrogenhalide reactions N79-27253
HALOS
A search for X-ray emission from rich clusters, extended halos around clusters, and superclusters
[NASA-TM-80294] N79-28092
HAMILTONIAN FUNCTIONS
Fermion Hamiltonians with monopole and quadrupole pairing
[LA-UR-79-241] N79-27947
Nonlinear models in Hamiltonian dynamics and statistical mechanics N79-28034
HANDLING EQUIPMENT
Handling problems through compressor deterioration N79-27169
HANFORD REACTORS
Radioactive wastes at the Hanford Reservation: A technical review
[COO-2708T004-1] N79-27963

HARMONICS
Fourteenth-order harmonics from analysis of mean longitude variations of resonant satellites
[TUM-MITT-132] N79-27223
HARTREE APPROXIMATION
A systematic determination of extended atomic orbital basic sets and application to molecular SCF and MCSCF calculations
N79-27941
HEAO 1
Pulse phase spectroscopy of Hercules X-1
[NASA-TM-80299] N79-28078
HEARING
Magnitude estimation as a hearing aid selection procedure
N79-27838
HEART FUNCTION
Characterization of cardiovascular function by automated monitoring of cardiac contractility and left ventricular wall motion activity
N79-27842
HEAT
Effects of the liberation of the latent heat of condensation on the development of disturbances at median latitudes
[INPE-1438-TDL/005] N79-27776
HEAT EXCHANGERS
Assessment of materials for use in a solar ceramic receiver for chemical process heat
[ORNL/TM-6715] N79-27681
HEAT OF COMBUSTION
Enthalpy of combustion of RJ-6
[AD-A067968] N79-28037
HEAT OF VAPORIZATION
Effects of the liberation of the latent heat of condensation on the development of disturbances at median latitudes
[INPE-1438-TDL/005] N79-27776
HEAT PIPES
Flight test of four ESTEC heat pipes as a part of the payload planner for launch on an ARIES rocket
[ESA-CR[P]-1146] N79-27222
Heat pipes with headers and single and two phase artery systems
[NEL-656] N79-27473
HEAT PUMPS
Metal hydride solar heat pump and power system [HYCSOS]
[CONF-781133-5] N79-27675
Recovery of wasted heat with centralized and distributed heat pump systems
[CONF-781202-32] N79-27696
HEAT RESISTANT ALLOYS
Study of two heat resistant nickel alloys for turbomachine plates
[REPT-20-393] N79-27147
HEAT STORAGE
Recovery of wasted heat with centralized and distributed heat pump systems
[CONF-781202-32] N79-27696
Storage systems analysis --- Solar Thermal Power Program
[SERI/PR-35-101] N79-27705
Room heat storage processes
[BMFT-FB-T-78-14] N79-27711
HEAT TRANSFER
Spacelab follow-on development: Executive summary. Heat rejection augmentation and increased capability for the Spacelab liquid loops
[RP-AI-0239] N79-27238
An examination of a group-velocity criterion for the breakdown of an idealized vortex flow
[NASA-TM-78541] N79-27436
Roughness phenomena in turbulent flow
N79-27446
Transient heat transfer in concrete
[CONF-781079-4] N79-27469
Heat pipe qualification requirements --- spacecraft components
[ESA-PSS-49/TST-01-ESTEC] N79-27471
Heat pipes with headers and single and two phase artery systems
[NEL-656] N79-27473
Some analytic models of passive solar building performance: A theoretical approach to the design of energy-conserving buildings
N79-27651
Behavior of the thermal skin of cooling pond waters subjected to moderate wind speeds
[CONF-781213-3] N79-27722
The human micro-environment
N79-27851
HEAT TRANSMISSION
HSLAB: An interactive program for one dimensional heat flow problems
[FOA-C-20288-D6[A3]] N79-27474
Heat flow and heat production studies in North Dakota
N79-27649
A nonlinear hyperbolic volterra equation arising in heat flow
[AD-A068898] N79-28038
HEAT TREATMENT
Effect of thermal annealing in boron implanted, laser annealed silicon
[CONF-781167-5] N79-27250
HEATING EQUIPMENT
Reliability and maintainability evaluation of freezing in solar systems
[ANL/SDP/TM-78-3] N79-27674
HEAVY IONS
On the reliability of heavy ion detection in the plasma flow near M
[PR-427] N79-28093
HEAVY NUCLEI
Fermion Hamiltonians with monopole and quadrupole pairing
[LA-UR-79-241] N79-27947
Quantum mechanics and quarkonium: An introductory review
[FERMILAB-CONF-78/82-THY] N79-28039
HELICOPTER ENGINES
Prediction of aeroelastic instabilities in rotorcraft
N79-27159
HELICOPTER PERFORMANCE
A flight investigation of basic performance characteristics of a teetering-rotor attack helicopter
[NASA-TM-80112] N79-27097
Review of airworthiness standards for certification of helicopters for Instrument Flight Rules [IFR] operation
[AD-A068397] N79-27127
HELICOPTERS
The influence of feedback on the aeroelastic behavior of tilt proprotor aircraft including the effects of fuselage motion
[NASA-CR-158778] N79-27125
HELIOS 2
Gamma-ray burst observations from Helios-2
[NASA-TM-80284] N79-28115
HELIUM
Piecewise polynomial configuration interaction natural orbital study of 1s2 helium
N79-27259
Analysis of direct nuclear pumped noble gas lasers
N79-27487
Helium-oxygen mixture and the organism hyperbaric aspect
N79-27818
Toxicity of oxygen mixed with helium
N79-27829
HELIUM ATOMS
Total scattering cross sections for He[2(1)S, 2[3]S] on He, Ne, Ar, Kr in the thermal energy region
[MPIS-7/1978] N79-27951
HELIUM ISOTOPES
A bolometer for 0.3 Kelvin
[MPI-PAE/EXTRATERR-143] N79-27486
HERCULES NOVA
Pulse phase spectroscopy of Hercules X-1
[NASA-TM-80299] N79-28078
HEURISTIC METHODS
Automatic discovery of heuristics for non-deterministic programs
[AD-A067546] N79-27876
HIGH ALTITUDE
Pershing 2 alternate altimeter replacement scheme
[AD-A068168] N79-27483
HIGH ALTITUDE BALLOONS
Zero and superpressure free flight ballooning
[AWRE-0-61/78] N79-27111
HIGH ENERGY INTERACTIONS
Transverse momentum distributions in Drell-Yan processes
[ILL-[TH]-79-22] N79-27897
High energy physics studies. Part 1: Experimental program. Part 2: Theoretical program
[COO-1545-243] N79-27960
High energy behavior of pion-nucleon-scattering partial waves from amplitude analysis
[REPT-78] N79-27969
Globally baryon symmetric cosmology, GUT spontaneous symmetry breaking, and the structure of the universe
[NASA-TM-80306] N79-28090
Extraterrestrial high energy neutrino fluxes
[NASA-TM-80304] N79-28116
HIGH FREQUENCIES
Propagation at medium and high frequencies. 1: Practical radio systems and modelling needs
N79-27386
Propagation at medium and high frequencies. 2: Long and short-term models
N79-27392
Introduction to physics of gas lasers
N79-27490
HIGH GAIN
Studies of prototype high-gain micro-channel plate photomultipliers
[LBL-7957] N79-27410
HIGH POWER LASERS
High-power gas lasers, volume 2
[VKI-LECTURE-SERIES-65-VOL-2]
N79-27491
High power electric discharge laser
N79-27492
Chemical lasers
N79-27493
Lasers: Their applications and operational requirements
N79-27494
HIGH PRESSURE
High pressure arcs in SF6. Part 4: Field strength measurements in blown SF6-arcs
[BMT-FB-T-78-06-PT-4] N79-27422
Some flow characteristics of conventional and tapered high pressure drop simulated seals
[NASA-TM-79192] N79-27460
Design, development, and test of a laser velocimeter for a small 8:1 pressure ratio centrifugal compressor
[NASA-CR-134781] N79-27478
Helium-oxygen mixture and the organism hyperbaric aspect
N79-27818
HIGH RESOLUTION
Background radiation in some recent high-resolution measurements in gamma-ray astronomy
[INPE-1474-RPE/025] N79-28076
HIGH SPEED
Aircraft and avionic related research required to develop an effective high-speed runway exit system
[NASA-CR-159075] N79-27185
HIGH TEMPERATURE
Review of the AGARD S and M panel evaluation program of the NASA-Lewis SRP approach to high-temperature LCF life prediction
N79-27179
HIGH TEMPERATURE TESTS
High temperature properties of sintered alpha silicon carbide
[CONF-7810129-2] N79-27251
HIGH VOLTAGES
High voltage surface-charged environment test results from spacc flight and ground simulation experiments
[NASA-TM-79184] N79-27235
HIGHWAYS
Lightning protection for traffic control systems
[NASA-CR-158779] N79-27401
Use of wind fluctuation statistics to estimate dispersion near roadways
N79-27558
HOLE MOBILITY
Theory of hole transport in rare gas solids
N79-28022
HOLOGRAPHY
Displacement and strain measurement using focused image holography
N79-27528
HOMOGENEITY
Determination of homogeneous zones by remote sensors
[INPE-1470-RPE/021] N79-27641
Gauge invariant perturbation theory in spatially homogeneous cosmology
N79-28086
HUMAN BODY
Pneumotachographic distinctions of external respiration in man in the presence of excess intrapulmonary pressure on ground level and at high altitudes
N79-27827
Refinement and validation of a mathematical model of the human torso
N79-27841
The human micro-environment
N79-27851
Effects of vibration on the human organism
N79-27862
HUMAN FACTORS ENGINEERING
Study of the theoretical to real correspondance of an optimal control model and the significance of this model for the description of working methodology with partly automated aircraft guidance and control systems
[ILR-35] N79-27184
Apparatus and method of inserting a microelectrode in body tissue or the like using vibration means
[NASA-CASE-NPO-13910-1] N79-27836
Refinement and validation of a mathematical model of the human torso
N79-27841
HUMAN PATHOLOGY
ESR studies on different pathological states
[ISS-L-22/9] N79-27854
HUMAN PERFORMANCE
The effects of context on multidimensional spatial cognitive models
[NASA-TM-58219] N79-28045
HUMIDITY
Preliminary assessment of temperature induced radiosonde humidity errors and effects on apparent low-level refractive structures, block program WF 52-55-091
[AD-A068670] N79-27784
HYDRAULIC EQUIPMENT
Performance of a hydraulic air compressor for use in compressed air energy storage power systems --- Conferences
[CONF-781202-27] N79-27693

Thermodynamic methods for determining losses in hydraulic components: A survey
[NEL-657] N79-28042

HYDROCARBON FUEL PRODUCTION
The H-Coal processes: A status report
N79-27617

HYDROCARBON FUELS
EXXON donor solvent coal liquefaction process
N79-27618

HYDROCARBONS
Photosensitized oxidation of unsaturated polymers
[NASA-TM-78604] N79-27241
X-ray excited optical luminescence of poly-nuclear aromatic hydrocarbons
N79-27266
An experimental study of the sensitiveness of unconfined hydrocarbon-air mixtures to direct detonative initiation
[PERME-TR-44] N79-27340
Remote sensing of hydrocarbon pollution
N79-27725
Catalysis by platinum single crystal surfaces: Low pressure hydrocarbon reactions and the effects of introducing strongly bound oxygen at the surface
N79-28012

HYDRODYNAMIC EQUATIONS
Kinetic versus hydrodynamic solar wind models
[AERONOMICA-ACTA-A-196-1978]
N79-28107

HYDRODYNAMICS
A three-dimensional model of co-rotating streams in the solar wind. 2: Hydrodynamic streams
[NASA-TM-80276] N79-28110

HYDROELECTRIC POWER STATIONS
Environmental readiness document. Small scale low head hydro: Commercialization, phase 3 planning
[DOE/ERD-0009] N79-27686

HYDROFLUORIC ACID
Studies of the Navy-ARPA Chemical Laser [NACL] exhaust
[AD-A068079] N79-27496

HYDROGEN
Study of the behavior of gas distribution equipment in hydrogen service update 1978
[CONF-781142-5] N79-27328
A low temperature ultrasonic study of hydrogen in niobium
N79-28019
Development of hydrogen and hydroxyl contamination in thin silicon dioxide thermal films
[AD-A067963] N79-28027
Hydrogen diffusion and electronic structure parameters in tantalum hydrides determined by pulsed NMR measurements
[IS-M-178] N79-28029

HYDROGEN ATOMS
Exchange perturbation theories applied to electron-hydrogen atom scattering
N79-27942
Hydrogen in germanium
[LBL-7996] N79-28030

HYDROGEN COMPOUNDS
Thermal rate constants, energy dependence and isotope effect for laser initiated halogen-hydrogenhalide reactions
N79-27253

HYDROGEN ISOTOPES
Oxygen and hydrogen isotopic fractionation factors determined in experimental clay-water systems
N79-27740

HYDROGEN OXYGEN FUEL CELLS
Bibliographical study of electrocatalysis involving mixed oxide compounds in an alkaline medium
[P/539/77/20] N79-27284

HYDROGENATION
The H-Coal processes: A status report
N79-27617
EXXON donor solvent coal liquefaction process
N79-27618

HYDROGEOLOGY
A study of the theoretical and practical determination of hydrogeological parameters in glacial outwash sands by surface geoelectrics
N79-27733

HYDROLOGY
Documentation of a ground hydrology parameterization for use in the GISS atmospheric general circulation model
[NASA-CR-158766] N79-27632

HYDROLYSIS
Material and energy balances in the production of ethanol from wood --- conferences
[CONF-7806139-1] N79-27338

HYDROXYL COMPOUNDS
Measurement of the rate constant for the NO+HO2 yields OH+NO2 reaction using laser magnetic resonance
[MPIS-8/1978] N79-27285
Research on elementary HO2 and OH radical reactions in the gas phase using laser magnetic resonance
[MPIS-10/1978] N79-27286

HYDROXYL EMISSION
Comments on the paper entitled the quenching of OH' in the atmosphere by Llewellyn, Long and Solheim
[INPE-1484-RPE/030] N79-27745

HYDROXYL RADICALS
Development of hydrogen and hydroxyl contamination in thin silicon dioxide thermal films
[AD-A067963] N79-28027

HYPERBARIC CHAMBERS
Effect of hyperbaric oxygen on peripheral blood neutrophil metabolism
N79-27830

HYPERBOLAS
An experimental study of sound radiation from hyperboloidal inlet ducts
[NASA-TM-80109] N79-27931

HYPERFINE STRUCTURE
Depth profiling of the magnetic hyperfine field in ultra-thin films of iron
N79-28020

HYPERSONIC BOUNDARY LAYER
Effective difference method for solving non-stationary two dimensional hypersonic flow boundary layer problems under chemical nonequilibrium conditions
[KU-RZ-9/1977] N79-27104
The influence of error introduced by thermal stable thermodynamic and kinetic reaction variables on the solution of equations for two-dimensional laminar hypersonic boundary layers
[KU-RZ-10/1977] N79-27105
Influence of chemical reactions and other parameters on the hypersonic boundary layer in air
[KU-RZ-12/1977] N79-27106
AGARD-VKI Short Course on Hypersonic Boundary Layers
[VKI-LECTURE-SERIES-12] N79-27437
Derivation of the basic equations for non-equilibrium boundary layers
N79-27438
Reacting and interacting hypersonic boundary layers
N79-27439
Hypersonic boundary layers
N79-27441
Downstream laminar boundary layer with mass additions
N79-27442
Hypersonic turbulent boundary layers without mass addition
N79-27444
Hypersonic turbulent boundary layers with mass addition
N79-27445

HYPERSONIC FLOW
Interferometric techniques and data evaluation methods for the utias 10 cm x 18 cm hypervelocity shock tube
[AD-A067957] N79-27187
Derivation of the basic equations for non-equilibrium boundary layers
N79-27438
Boundary layer transition
N79-27443

HYPERSONIC HEAT TRANSFER
Correlation of predicted and measured thermal stresses on an advanced aircraft structure with dissimilar materials --- hypersonic heating simulation
[NASA-TM-72865] N79-27088

HYPERSONIC WIND TUNNELS
A long stroke isentropic free piston hypersonic wind tunnel
[AASU-334] N79-27190
Extension of running time in the RAE hypersonic shock tunnel
[QUEL-1260/78] N79-27191

HYPERSPACES
On the existance of physical spaces with a dimensionality of N not equals 3 + 1
[PR-400] N79-28041

HYPOKINESIA
Effect of brief head-down hypokinesia on pressure in various parts of the healthy man's cardiovascular system
N79-27831

HYPOTHALAMUS
Catecholamines and enzymes of metabolism thereof in the rat hypothalamus after flight aboard Cosmos-782 biosatellite
N79-27822

HYPOXIA
Effect of acute hypoxia on some parameters of renal excretory function and renal hemodynamics
N79-27828

I

ICE FORMATION
Computer modeling of atmospheric ice accretion
[AD-A068582] N79-27785

IDAHO
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629

IDENTIFYING
Microbial load monitor
[NASA-CR-160274] N79-27815

ILLINOIS
Solar energy information and data for Illinois
[PB-292712/7] N79-27800

IMAGE CONTRAST
Study of a method for filtering optical images
[BNWL-TR-342] N79-27980
Image quality of a Wolter-1 type X-ray telescope under particular contrast reduction conditions due to diffuse reflection
[MPI-PAE/EXTRATERR-145] N79-27984

IMAGE FILTERS
Study of a method for filtering optical images
[BNWL-TR-343] N79-27979

IMAGE PROCESSING
Activities of the Laboratory for Image Processing, 1978
[FOA-C-30159-E1] N79-27870
Software requirements for the study of contextual classifiers and label imperfections
[NASA-CR-160239] N79-27875
Photo-electro-optical reproduction technology survey
[AD-A067534] N79-27977

IMAGERY
Displacement and strain measurement using focused image holography
N79-27528
Evaluation of registration, compression and classification algorithms. Volume 1: Results
[NASA-TM-78227-VOL-1] N79-27630

IMAGES
Classification of multispectral images of natural resources using table look-up approach and clustering
[INPE-1439-TDL/006] N79-27642

IMAGING TECHNIQUES
Dense transparent ferroelectric ceramics for optical applications
[BMFT-FB-T-78-17] N79-27319
Optical treatment of information
[FUB-17-1977] N79-27374
Video transmission with reduced information rate (picture compression). A system with source coding for transmission of video signals for portrait videotelephone
[BMFT-FB-T-78-50] N79-27384
Egypt as seen by LANDSAT
N79-27626
Program library for handling and processing of remotely sensed multispectral data
[FOA-C-30146-E1] N79-27646
Activities of the Laboratory for Image Processing, 1978
[FOA-C-30159-E1] N79-27870
Study of real-time converter of an incoherent image into a transparency: Optical to optical converter/technology study
[ESA-CR[P]-1155] N79-27988

IMMUNOLOGY
Immunological reactivity of rats flown aboard Cosmos-605 and Cosmos-690 biosatellites
N79-27824

IMPACT DAMAGE
Impact damage on titanium leading edges from small hard objects
[AD-A068458] N79-27293

IMPACT RESISTANCE
MK 82 bomb ejection sensitivity test report
[AD-A068583] N79-27132
The integrity of aircraft jet engines under the impact of foreign bodies
N79-27174

IMPACT TESTS
Animal endurance to recurrent impact accelerations
N79-27833

IMPEDANCE MEASUREMENTS
Electrical group impedance measurements in the United States between 200 and 415 kHz
[AD-A068088] N79-27352

IMPELLERS
Structural analysis of a gas turbine impeller using finite-element and holographic techniques
N79-27149
Some theoretical and experimental investigations of stresses and vibrations in a radial flow rotor
N79-27158

IMPULSES
Modal analysis of compressor blades by means of impulse excitation
N79-27165

IMPURITIES
An EUV study of impurities in the Alcator A tokamak
N79-27996
A study of impurity and radiation induced point defects in MgAl2O4 (spinel)
N79-28015

IN-FLIGHT MONITORING
Preliminary trend monitoring system data manager's guide
[NASA-CR-160251] N79-27232
INCOMPRESSIBLE FLOW
Unsteady flows --- flow equations
N79-27431
INCOMPRESSIBLE FLUIDS
A Lagrangian method for calculating the dynamics of an incompressible fluid with free surface
N79-27453
INCONEL [TRADEMARK]
Study of two heat resistant nickel alloys for turbomachine plates
[REPT-20-393] N79-27147
INDIA
Indian national committee for space research report to COSPAR
N79-27194
Canada report to COSPAR --- conferences
N79-27195
INDIANA
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629
INDIUM PHOSPHIDES
InP and GaAs surface characterization with variable stoichiometry obtained by molecular spray. Applications to the manufacture of Schottky diodes
[LCR-2270-DK] N79-27414
INDUCTION [MATHEMATICS]
Induction of decision rules
[INPE-1492-RPE/036] N79-27920
INDUSTRIAL AREAS
Tests of the climatological dispersion model and Gaussian Models at the Strait of Canso and at Lingan, Nova Scotia
N79-27584
Insolation measurements in and near an industrial region of the Netherlands
[KNMI-WR-78-14] N79-27727
INDUSTRIAL ENERGY
Potential for cogeneration of heat and electricity in California industry, phase 2
[NASA-CR-158772] N79-27658
INDUSTRIAL MANAGEMENT
Potential for cogeneration of heat and electricity in California industry, phase 2
[NASA-CR-158772] N79-27658
INDUSTRIAL PLANTS
Field investigations of the dispersion of pollution across a ridge
N79-27548
A climatology of meteorological parameters for short-range dispersion and long-range transport
N79-27577
A multi-scale dispersion model for local and regional sulfur dioxide/sulfate concentrations: Formulation and initial evaluation
N79-27578
A plume dispersion study at Mildred Lake, Alberta
N79-27581
The ratio of peak 1-hour average concentrations to peak concentrations of other averaging times for various pollutants and differing sources
N79-27582
Validation of CRSTER model air quality estimates for an industrial plant
N79-27583
Stability sensitivity of the climatological dispersion model: A practical examination --- using emission data from an industrial plant
N79-27588
INDUSTRIAL SAFETY
Problems related to the assessment of safe exposure levels for radio frequency and microwave radiation
[ISS-P-78/7] N79-27855
INDUSTRIES
Lasers: Their applications and operational requirements
N79-27494
Noise from industrial fans
N79-27511
Study of pharmaceutical industrial problems
[NASA-CR-160267] N79-27852
INERTIAL NAVIGATION
Geodetic applications of inertial navigational systems
[AD-A067179] N79-27121
INFINITY
Separably-infinite programs
[AD-A068923] N79-27882
INFORMATION RETRIEVAL
Nondestructive testing information analysis center, 1978
[AD-A068669] N79-27525
On the complexity of multivariable query evaluation
[FOA-C-20292-D8] N79-27913
Analysis of costs and benefits in automated information systems
[FUB-45-1977] N79-28055
INFORMATION SYSTEMS
Nondestructive testing information analysis center, 1978
[AD-A068669] N79-27525
Federal Information Centers Act --- congressional reports
[H-REPT-95-1530] N79-28049
Analysis of costs and benefits in automated information systems
[FUB-45-1977] N79-28055
INFORMATION THEORY
A duality theory for a class of problems with essentially unconstrained duals
[AD-A067755] N79-27924
Planning nets: A representation for formalizing analogies and semantic models of procedural skills
[AD-A067907] N79-28050
INFRARED PHOTOGRAPHY
Remote sensing of hydrocarbon pollution
N79-27725
INFRARED RADIATION
A bolometer for 0.3 Kelvin
[MPI-PAE/EXTRATERR-143] N79-27486
An experimental system to measure atmospheric extinction of visible, near and far infrared radiation in the marine boundary layer
[AD-A067557] N79-27751
A computer program for calculating infrared fluxes
[KNMI-WR-78-15] N79-27766
INFRARED SCANNERS
Testing of missile guidance and control systems
N79-27231
INFRARED SPECTRA
Modelling of the visible/infrared propagation environment
N79-27388
INFRARED WINDOWS
Optical materials characterization
[PB-292245/8] N79-27990
INGESTION [ENGINES]
The integrity of aircraft jet engines under the impact of foreign bodies
N79-27174
INJECTION
Hypersonic turbulent boundary layers with mass addition
N79-27445
INLET FLOW
Performance of a V/STOL tilt nacelle inlet with blowing boundary layer control
[NASA-TM-79176] N79-27093
INORGANIC COMPOUNDS
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
N79-27264
INSERTION
Apparatus and method of inserting a microelectrode in body tissue or the like using vibration means
[NASA-CASE-NPO-13910-1] N79-27836
INSOLATION
Insolation measurements in and near an industrial region of the Netherlands
[KNMI-WR-78-14] N79-27727
INSTRUMENT COMPENSATION
Evaluation of a self-calibrating silicon bolometer
[AD-A068083] N79-27484
INSTRUMENT ERRORS
Tectonic motion site survey of the National Radio Astronomy Observatory, Green Bank, West Virginia
[NASA-TM-79691] N79-27748
INSTRUMENT FLIGHT RULES
Review of airworthiness standards for certification of helicopters for Instrument Flight Rules [IFR] operation
[AD-A068397] N79-27127
INSTRUMENT PACKAGES
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160271] N79-27349
INSULATORS
Magnetic effects in integrated optics
[LCR-494-292] N79-27982
INTAKE SYSTEMS
Unsteady rotor blade loading in an axial compressor with steady-state inlet distortions
N79-27176
Distortions, rotating stall and mechanical solicitations
N79-27177
The unsteady aerodynamics of a cascade in translation
N79-27180
Earth winds, flow quality, and the minimum-protection inlet treatment for the NASA Ames 80- by 120-foot wind tunnel nonreturn circuit
[NASA-TM-78600] N79-27186
Acoustic silencers for inlet and exhaust of turbomachinery
N79-27514
An experimental study of sound radiation from hyperboloidal inlet ducts
[NASA-TM-80109] N79-27931
Analysis, design, and test of acoustic treatment in a laboratory inlet duct
[NASA-CR-3161] N79-27934
INTEGRAL EQUATIONS
Boundary-integral equation analysis of an advanced turbine disk rim slot
N79-27161
The numerical solution of singular integral equations and applications to mixed boundary value problems of fracture mechanics
N79-27529
Vincent's theorem in algebraic manipulation
N79-27890
INTEGRATED CIRCUITS
Total-dose radiation-hardened CMOS integrated circuits
[AD-A067975] N79-27403
Monolithic 20w 2GHz transistor and monolithic 5w 4GHz transistor
[AD-A068165] N79-27408
Integrated high frequency circuits
[BMFT-FB-T-78-24] N79-27427
INTERFACIAL ENERGY
The influence of the forces of interaction between solids on their adhesiveness
N79-27317
Interface and electron tunneling properties of thin oxides on silicon
N79-28023
INTERFEROMETRY
Acoustical speckle interferometry
[AD-A067664] N79-27935
INTERGALACTIC MEDIA
A study of the molecular complexes accompanying MON OB1 MON OB2 and CMA OB1
N79-28068
INTERGRANULAR CORROSION
Ultrasonic pattern recognition study of intergranular stress corrosion cracks vs weld crown reflectors in SS piping
[EPRI-NP-891] N79-27297
INTERMOLECULAR FORCES
Theoretical aspects of the resonant scattering of light by molecules
N79-27943
INTERNAL COMBUSTION ENGINES
Exhaust emissions characteristics of 5 aircraft piston engines
[AD-A069012] N79-27719
INTERNATIONAL COOPERATION
Review of the AGARD S and M panel evaluation program of the NASA-Lewis SRP approach to high-temperature LCF life prediction
N79-27179
Indian national committee for space research report to COSPAR
N79-27194
Canada report to COSPAR --- conferences
N79-27195
Japan national report on space research
N79-27196
Satellite communications for disaster relief operations
[NASA-TM-79198] N79-27351
European sponsored astronomical research activities
[AR-1977] N79-28080
INTERPLANETARY MAGNETIC FIELDS
Periodicities in the interplanetary magnetic field polarity
[INPE-1425-RPE/005] N79-28089
The mean free path of low rigidity cosmic rays
[NASA-TM-80290] N79-28114
INTERPLANETARY MEDIUM
Research in space physics at the University of Iowa
[NASA-CR-158782] N79-28065
INTERPLANETARY SPACE
Gamma-ray burst observations from Helios-2
[NASA-TM-80284] N79-28115
INTERPOLATION
Computation of potential flow around bodies
N79-27456
Surface wind analysis overland in the Netherlands, based on an optimum interpolation method
[KNMI-WR-78-17] N79-27797
Optimum interpolation of radiosonde and satellite-derived temperature fields
[PB-293017/0] N79-27798
INTERSTELLAR EXTINCTION
Laboratory analogues to cosmic dust
N79-27275
INTERSTELLAR GAS
A study of the molecular complexes accompanying MON OB1 MON OB2 and CMA OB1
N79-28068
INTERSTELLAR MASERS
An interferometric and multi-transitional study of the Orion methanol masers
N79-28070
INVENTORY CONTROLS
Reliability control model for stored items requiring rework
[AD-A067560] N79-27524
IODINE LASERS
Chemical lasers
N79-27493
ION ATOM INTERACTIONS
Transport properties in the atmosphere of Jupiter
[NASA-CR-158783] N79-28100

ION CURRENTS
The application of ion convection to the development of an electronic spirometer
N79-27477
ION EXCHANGING
Magnetic exchange interactions in copper[II] complexes propagated by extended bridging groups
N79-27263
Transport studies of ion exchange membranes
N79-27268
ION IMPLANTATION
Ion implantation and its effects on the propagation of elastic surface waves
[LCR-494-305] N79-27368
ION SELECTIVE ELECTRODES
Field effect ion selectivity, part 1. Electrochemical noise, part 2
N79-27270
IONIZATION CROSS SECTIONS
The calculation of autoionization positions and widths with applications to penning ionization reactions
N79-27254
IONIZATION POTENTIALS
Orbital interactions in molecules studied by ultraviolet photoelectron spectroscopy --- ionization potentials and metal-metal bonding in transition metal carbonyl complexes
N79-27939
IONOSPHERE
Ionospheric research
[NASA-CR-158762] N79-27744
IONOSPHERIC DISTURBANCES
Geophysical disturbance effects on the state of the propagation medium and their predictability
N79-27391
On the generation of 3 meter irregularities during equatorial spread F by low frequency drift waves
[AD-A068580] N79-27754
IONOSPHERIC HEATING
Platteville heating results: HF radar observations
[AD-A068163] N79-27361
IONOSPHERIC PROPAGATION
Propagation effects on satellite communication systems operating in the range of 240 to 3000 megahertz
[AD-A067535] N79-27358
Transionospheric radio propagation
N79-27387
On the generation of 3 meter irregularities during equatorial spread F by low frequency drift waves
[AD-A068580] N79-27754
IONOSPHERICS
Ionospheric research
[NASA-CR-158762] N79-27744
IONS
Mass spectrometric studies of some ions
N79-27257
Magnetic exchange interactions in copper[II] complexes propagated by extended bridging groups
N79-27263
IOWA
Research in space physics at the University of Iowa
[NASA-CR-158782] N79-28065
IRIDIUM
Dissolution processes of aluminum oxide on tungsten, iridium, molybdenum, tantalum, and rhenium as a function of electric field strength
N79-28013
IRON
Depth profiling of the magnetic hyperfine field in ultra-thin films of iron
N79-28020
IRON ALLOYS
Mossbauer study of Y[Fe(0.022)Co(0.978)2] from 259K to 0.18K using a stochastic model of magnetic ordering
N79-28014
Material science and solid state physics studies with positive muon spin precession --- fe[a1] alloys
[NASA-CR-158786] N79-28025
IRON ISOTOPES
Measurement of the isotopic composition of the iron group elements in the galactic cosmic radiation
N79-28113
IRON METEORITES
I-Xe dating of silicate and troilite from IAB iron meteorites
N79-28095
Cape York: The extraordinary mineralogy of an ordinary iron meteorite and its implication for the genesis of III AB irons
N79-28099
IRON OXIDES
In depth study of the magnetocrystalline anisotropy of polycrystalline ferrimagnetic oxides
[LCR-1437/77] N79-28032
IRRADIATION
Biological effects of laser irradiation on nerve cells
N79-27840
IRREVERSIBLE PROCESSES
Kinetic models for irreversible processes on a lattice
N79-28011
IRRIGATION
Photovoltaic-powered irrigation experiments in the United States --- crop drying and irrigating in Nebraska
[COO-4094-28] N79-27673
ISENTROPIC PROCESSES
A long stroke isentropic free piston hypersonic wind tunnel
[AASU-334] N79-27190
ISLANDS
A comparison of surface diffusion of air pollutants over water and land [an artificial island in the North Sea]
[KNMI-WR-78-13] N79-27790
ISOMERIZATION
IR laser induced dissociation of N2F4 and isomerization of CH3NC
[MPIS-12/1978] N79-27287
ISOTOPE EFFECT
Thermal rate constants, energy dependence and isotope effect for laser initiated halogen-hydrogenhalide reactions
N79-27253
ISOTOPE SEPARATION
Lasers: Their applications and operational requirements
N79-27494
ISOTOPES
Measurement of the isotopic composition of the iron group elements in the galactic cosmic radiation
N79-28113
ITALY
Validation of the SO2 emission inventory for the Milan district area [50 X 60 km]
N79-27595
ITERATIVE SOLUTION
Experiments with iterative methods for solving the discrete Poisson equation
[KNMI-WR-79-1] N79-27914

J

JAPANESE SPACE PROGRAM
Japan national report on space research
N79-27196
JET ENGINE FUELS
Findings and views concerning the exemption of kerojet fuels from the mandatory petroleum allocation and price regulations
[DOE/ERA-0023] N79-28058
JOINTS (JUNCTIONS)
Effect of variances and manufacturing tolerances on the design strength and life of mechanically fastened composite joints
[AD-A069170] N79-27518
Ultrasonic inspection of wing spar attachment joints and lugs in viscount aircraft
[REPT-7610.910] N79-27523
Bolted Joint Fatigue Programme. Volume 1: Stage 1, sections 1 to 6
[S/T-MEMO-1/77-VOL-1] N79-27536
Bolted Joint Fatigue Programme. Volume 2: Stage 1, appendices A, B, and C
[S/T-MEMO-1/77-VOL-2] N79-27537
Bolted Joint Fatigue Programme. Volume 3: Stage 2, supplementary investigations 1 to 6
[S/T-MEMO-1/77-VOL-3] N79-27538
Bolted Joint Fatigue programme. Volume 4: Stage 2, supplementary investigations 7 to 9
[S/T-MEMO-1/77-VOL-4] N79-27539
JORDAN FORM
Calculation of functions of some particular matrices
[FUB-11-1977] N79-27926
JOURNAL BEARINGS
An investigation of vibration dampers in gas-turbine engines
N79-27164
JUNCTION TRANSISTORS
A dc model for power switching transistors suitable for computer-aided design and analysis
[NASA-CR-158764] N79-27396
JUPITER (PLANET)
Voyager 2 Jupiter encounter
[NASA-NEWS-RELEASE-79-86] N79-28094
JUPITER ATMOSPHERE
Transport properties in the atmosphere of Jupiter
[NASA-CR-158783] N79-28100
JUPITER PROBES
Voyager 2 Jupiter encounter
[NASA-NEWS-RELEASE-79-86] N79-28094
Voyager 1 planetary radio astronomy observations near Jupiter
[NASA-TM-80287] N79-28103
Magnetic field studies at Jupiter by Voyager 1: Preliminary results
[NASA-TM-80288] N79-28104

K

KALMAN FILTERS
Reliability control model for stored items requiring rework
[AD-A067560] N79-27524
Multiple time series modeling 2
[AD-A067644] N79-27901
KANSAS
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629
Geologic assessment of compressed air storage sites in Kansas
[EPRI-EM-877] N79-27689
KARHUNEN-LOEVE EXPANSION
Spectral analysis using the Karhunen-Loeve transform
[REPT-7-78] N79-27922
KEVLAR (TRADEMARK)
Flight service evaluation of Kevlar-49 epoxy composite panels in wide-bodied commercial transport aircraft
[NASA-CR-159071] N79-27246
KINEMATICS
Transverse momentum distributions in Drell-Yan processes
[ILL-(TH)-79-22] N79-27897
KINETIC EQUATIONS
Kinetic versus hydrodynamic solar wind models
[AERONOMICA-ACTA-A-196-1978] N79-28107
KINETIC THEORY
Macroscopic transport equations --- plasmas origin in kinetic theory
[INPE-1471-RPE/022] N79-27997
KINETICS
Algal growth kinetics in bioconversion of solar energy
N79-27650

L

LABORATORIES
Research activities of the Radiation Laboratory
[ISS-R-78/6] N79-27954
LABORATORY EQUIPMENT
NOSC Metrology Laboratory: Capabilities summary
[AD-A068564] N79-27343
LAGRANGE COORDINATES
A Lagrangian method for calculating the dynamics of an incompressible fluid with free surface
N79-27453
LAGRANGE SIMILARITY HYPOTHESIS
Analysis of 1st and 2nd moments of the concentration distribution for near ground releases of tracers in the atmosphere
N79-27559
LAKE CHAMPLAIN BASIN (NY-VT)
Energy use and supply in the Lake Champlain Basin
[PB-293437/0] N79-27713
LAKES
Wind mixing in lakes
N79-27625
LAMINAR BOUNDARY LAYER
The influence of error introduced by thermal stable thermodynamic and kinetic reaction variables on the solution of equations for two-dimensional laminar hypersonic boundary layers
[KU-RZ-10/1977] N79-27105
AGARD-VKI Short Course on Hypersonic Boundary Layers
[VKI-LECTURE-SERIES-12] N79-27437
The numerical solution of the nonsimilar laminar boundary-layer equations including the effects of nonequilibrium dissociation
N79-27440
Hypersonic boundary layers
N79-27441
Downstream laminar boundary layer with mass additions
N79-27442
Coupled interactions of shock-wave structure with laminar boundary layer in ionizing-argon shock-tube flows
[AD-A068869] N79-27467
LAMINAR FLOW
An algebraic expression for first-order reaction in laminar flow
N79-27470
LAMINATES
Effects of moisture on torsion and flexure properties of graphite-epoxy composites
[NASA-TM-78597] N79-27243
LANCE MISSILE
The 12831D Lance missile number 3306, round number 323, ESL
[AD-A067687] N79-27779

LANDSAT SATELLITES
Egypt as seen by LANDSAT
N79-27626
Evaluation of registration, compression and classification algorithms. Volume 1: Results
[NASA-TM-78227-VOL-1] N79-27630
Evaluation of registration, compression and classification algorithms. Volume 2: Documentation
[NASA-TM-78227-VOL-2] N79-27631
LANGUAGES
Contemporary soaring nomenclature
N79-27085
LARGE AREA CROP INVENTORY EXPERIMENT
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629
LASER APPLICATIONS
Thermal rate constants, energy dependence and isotope effect for laser initiated halogen-hydrogenhalide reactions
N79-27253
Kinetics and magnetic field effects on laser induced fluorescence in NO2
N79-27256
Laser photochemical reaction dynamics in formaldehyde
N79-27274
High-power gas lasers, volume 2
[VKI-LECTURE-SERIES-65-VOL-2]
N79-27491
Laser modulation of optical absorption in ZnSe
[NASA-CR-158789] N79-27976
LASER CAVITIES
High-power gas lasers, volume 1
[VKI-LECTURE-SERIES-65-VOL-1]
N79-27488
Introduction to physics of gas lasers
N79-27490
LASER DOPPLER VELOCIMETERS
Design, development, and test of a laser velocimeter for a small 8:1 pressure ratio centrifugal compressor
[NASA-CR-134781] N79-27478
Velocity measurements using a laser Doppler velocimeter on board SS Tydeman
[TPD-1978-0-2] N79-27485
LASER FUSION
Cryogenic laser fusion target materials
[LA-UR-79-101] N79-28002
LASER PLASMAS
X-ray emission from CH2 laser-produced plasmas at 10 to the 16th power w/cm-2
[AD-A067517] N79-27998
LASER PUMPING
Analysis of direct nuclear pumped noble gas lasers
N79-27487
LASER RANGE FINDERS
Correlation techniques and optimum signal methods in laser optics radar systems and practical measurement technique possibilities
[ILR-33] N79-27499
LASER TARGETS
Cryogenic laser fusion target materials
[LA-UR-79-101] N79-28002
LASERS
Two-photon reradiation from laser protective materials
[AD-A068466] N79-27497
Crossed laser and molecular beam study of multiphoton dissociation of C2F5Cl
[LBL-8090] N79-27498
Biological effects of laser irradiation on nerve cells
N79-27840
LATTICES [MATHEMATICS]
Non-finitely based binary algebras derived from lattices
N79-27891
LAUNCH VEHICLES
Optimum launch vehicle sizing
[AD-A068575] N79-27220
LAUNCHING
The 12824C lance, missile number 4661, round number 324 NPL
[AD-A067761] N79-27778
LAW [JURISPRUDENCE]
Federal Information Centers Act --- congressional reports
[H-REPT-95-1530] N79-28049
LAYOUTS
Degrees of freedom in the layout of Stirling engines
N79-27507
LEADING EDGES
Impact damage on titanium leading edges from small hard objects
[AD-A068458] N79-27293
LEAST SQUARES METHOD
Application of curve-fitting to X-ray photoelectron spectroscopy and cyclic voltammetry
N79-27265
LEAVES
Remote sensing of leaf water content in the near infrared
[NASA-TM-80291] N79-27639
LECTURES
AGARD-VKI Short Course on Hypersonic Boundary Layers
[VKI-LECTURE-SERIES-12] N79-27437
Stirling Engines
[VKI-LECTURE-SERIES-53] N79-27502
Noise in Turbomachines
[VKI-LECTURE-SERIES-81] N79-27509
Physiological fluid dynamics
[VKI-LECTURE-SERIES-32] N79-27843
LEE WAVES
Lee side flow field over slender delta wings of finite thickness
[ILR-23] N79-27103
LIFE [DURABILITY]
Forecasting engine life
N79-27154
Endurance and soil accumulation testing of photovoltaic modules at various MIT/LL test sites
[COO-4094-23] N79-27671
LIFE CYCLE COSTS
Comparative economic assessment of ethanol from biomass
[HCP/ET-2854] N79-27335
Market assessment of fuel cell total energy systems
[ORNL/CON-36] N79-27704
LIFE SUPPORT SYSTEMS
Characteristics of proteins of some unicellular organisms as potential components of ecological life support systems
N79-27834
LIFT
A Monte Carlo approach to competition strategy --- for maximum lift and airspeed
N79-27075
Leading-edge slat optimization for maximum airfoil lift
[NASA-TM-78566] N79-27100
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 1: Numerical aspects
N79-27458
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 2: Calculational aspects of solving the large systems of linear algebraic equations on a digital computer
N79-27459
LIGHT [VISIBLE RADIATION]
Chemiluminescence of dimethyldioxetane: Unimolecular generation of excited singlet and triplet acetone. Chemically initiated electron-exchange luminescence, the primary light generating reaction
[AD-A068920] N79-27281
Modelling of the visible/infrared propagation environment
N79-27388
New developments for vidicon-based uv-visible spectrometers
N79-27476
Suppression of scattered light
N79-27973
LIGHT AIRCRAFT
Treatment of the control mechanisms of light airplanes in the flutter clearance process
N79-27078
LIGHT SCATTERING
Response characteristics of Knollenberg light-scattering aerosol counters
[AD-A067701] N79-27750
Theoretical aspects of the resonant scattering of light by molecules
N79-27943
Light scattering studies of molecular motion in liquids
N79-27972
Suppression of scattered light
N79-27973
LIGHT SOURCES
Advice on the setting up of a workshop for treating tritium gas light sources at 527 ECW at Dongen
N79-27344
LIGHT SPEED
Gravitational radiation and the ultimate speed in Rosen's Bimetric theory of gravity
[NASA-CR-158718] N79-27743
LIGHT TRANSMISSION
Laser modulation of optical absorption in ZnSe
[NASA-CR-158789] N79-27976
LIGHTING EQUIPMENT
Power converter --- for display devices, lighting equipment
[NASA-CASE-FRC-11014-1] N79-27395
LIGHTNING
Lightning protection for traffic control systems
[NASA-CR-158779] N79-27401
LIMB DARKENING
The 10 February 1977 lunar occultation of Uranus. Radius, limb darkening, and polar brightening at 6900 A
[NASA-CR-158780] N79-28074
LINCOLN EXPERIMENTAL SATELLITES
Developing, testing, and operating Lincoln experimental Satellites 8 and 9 [LES-8/9]
[AD-A069095] N79-27218
LINE OF SIGHT COMMUNICATION
Missile guidance techniques
N79-27230
LINE SPECTRA
Study on the ultraviolet radiation of the atmosphere of Venus --- venera 11 and 12 observations
N79-28098
LINEAR EQUATIONS
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 2: Calculational aspects of solving the large systems of linear algebraic equations on a digital computer
N79-27459
LINEAR FILTERS
Noise adaptive filter
N79-27216
Study of a method for filtering optical images
[BNWL-TR-343] N79-27979
LINEAR PREDICTION
Estimation of the parameters of an autoregressive process in the presence of additive white noise
[AD-A068749] N79-27363
LINEAR PROGRAMMING
A new hardware approach to coefficient determination for the linear prediction of speech
N79-27863
Separably-infinite programs
[AD-A068923] N79-27882
A bi-extremal principle for estimating efficiency frontier parameter values
[AD-A068992] N79-28046
LINEAR TRANSFORMATIONS
Physical components of tensors
N79-27896
LININGS
On the attenuation of sound by three-dimensionally segmented acoustic liners in a rectangular duct
[NASA-TM-80118] N79-27932
LIQUID CHROMATOGRAPHY
The identification and quantitation of UV absorbing compounds in serum by reversed-phase high performance liquid chromatography
N79-27269
Multidimensional high resolution gas liquid chromatography in trace organic analysis: Heartcutting with intermediate trapping
N79-27273
LIQUID CRYSTALS
Study of real-time converter of an incoherent image into a transparency: Optical to optical converter/technology study
[ESA-CR[P]-1155] N79-27988
LIQUID HYDROGEN
Turbine engine altitude chamber and flight testing with liquid hydrogen
[NASA-TM-79196] N79-27140
LIQUID NITROGEN
Condensation on a noncollapsing vapor bubble in a subcooled liquid
[NASA-TM-79212] N79-27461
LIQUID PHASES
Transitions above the glass transition temperature in amorphous polymers
N79-27299
A study of crystal growth by solution technique --- triglycine sulfate single crystals
[NASA-CR-158763] N79-28024
Molecular thermodynamics of vapor-liquid and liquid-liquid equilibra --- maximum likelihood estimates
N79-28036
LIQUID ROCKET PROPELLANTS
High performance N2O4/amine elements blowapart
[NASA-CR-160272] N79-27323
High performance N2O4/amine elements blowapart
[NASA-CR-160273] N79-27324
LIQUID-VAPOR EQUILIBRIUM
Vapor liquid equilibria for the systems water-methanol, waterethanol, methanol-ethanol, and water-methanol-ethanol at 298.15 K determined by a rapid transpiration method
[NPL-CHEM-95] N79-27290
Molecular thermodynamics of vapor-liquid and liquid-liquid equilibra --- maximum likelihood estimates
N79-28036
LIQUIDS
Light scattering studies of molecular motion in liquids
N79-27972
LITHIUM CHLORIDES
Two-thousand amp/hr primary lithiumthionylchloride cells: Test results
[FOA-C-30152-E5] N79-27710
LITHIUM OXIDES
High-resolution EPR and piezospectroscopy studies of the lithium-oxygen donor in germanium
[LBL-8429] N79-27283
LITHOSPHERE
The effect of a moving lithospheric plate on convection in the Earth's mantle
N79-27736

LOAD TESTS
Review of the AGARD S and M panel evaluation program of the NASA-Lewis SRP approach to high-temperature LCF life prediction
N79-27179

LOADING OPERATIONS
Microbial load monitor
[NASA-CR-160274] N79-27815

LOGIC DESIGN
On the complexity of multivariable query evaluation
[FOA-C-20292-D8] N79-27913

LOGISTICS MANAGEMENT
Cargo Logistics Airlift Systems Study (CLASS). Volume 3: Cross impact between the 1990 market and the air physical distribution systems, book 1
[NASA-CR-158914] N79-27112
Definition, description, and interfaces of the FAA's developmental programs. Volume 2: ATC facilities and interfaces
[AD-A068401] N79-27118
F-16 reliability improvement warranty. Implementation and management plan
[AD-A068561] N79-27133

LONG TERM EFFECTS
Morphological distinctions of the rat thyroid and parathyroid following long-term space flights
N79-27835

LONGITUDE MEASUREMENT
Fourteenth-order harmonics from analysis of mean longitude variations of resonant satellites
[TUM-MITT-132] N79-27223

LOSSES
Characteristics of low loss optical fibers obtained from commercially available dielectrics
[FUB-21-1977] N79-27986

LOUDNESS
The loudness of tinnitus
N79-27837

LOW ALTITUDE
Very low altitude drag-free satellites
[PB-293271/3] N79-27224

LOW ASPECT RATIO
Performance of two-stage fan having low-aspect-ratio first-stage rotor blading
[NASA-TP-1493] N79-27143

LOW ASPECT RATIO WINGS
Influence of optimized leading-edge deflection and geometric anhedral on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- langley 7 by 10 foot tunnel
[NASA-TM-80083] N79-27095

LOW PASS FILTERS
A voltage controlled active low pass filter
[RSRE-78013] N79-27417

LOW PRESSURE
Catalysis by platinum single crystal surfaces: Low pressure hydrocarbon reactions and the effects of introducing strongly bound oxygen at the surface
N79-28012

LOW SPEED
Science and Technology of Low Speed and Motorless Flight. Third International Symposium
[NASA-CR-2085] N79-27070

LOW TEMPERATURE
Low temperature, glass-like properties of crystalline beta-alumina
[COO-1198-1233] N79-27294
Measurements of dispersion coefficients in cold environment
N79-27560
A low temperature ultrasonic study of hydrogen in niobium
N79-28019

LOW TEMPERATURE TESTS
Mossbauer study of Y[Fe(0.022)Co(0.978)2] from 259K to 0.18K using a stochastic model of magnetic ordering
N79-28014

LOWER ATMOSPHERE
Investigation of near surface aerosol properties in arid regions
[AD-A068554] N79-27753

LUBRICANTS
An evaluation of grease type ball bearing lubricants operating in various environments
[NASA-TM-78232] N79-27515

LUBRICATING OILS
An investigation of vibration dampers in gas-turbine engines
N79-27164

LUBRICATION
Auger spectroscopy analysis of lubrication with zinc dialkyldithiophosphate of several metal combinations in sliding contact
[NASA-TP-1489] N79-27308
Ceramic mainshaft roller bearing performance in a gas turbine engine
[AD-A067904] N79-27516

LUMINAIRES
Potentialities for an improvement of the efficiency of fluorescent mercury lamps
[BMFT-FB-T-78-22] N79-27425

LUMINOUS INTENSITY
Photometry of a complete sample of faint galaxies
N79-28071

LUNAR EXPLORATION
What's new on the moon?
[NASA-EP-131] N79-28096

LUNAR MARIA
Thickness of western mare basalts
[NASA-CR-158784] N79-28101

LUNAR SURFACE
Thickness of western mare basalts
[NASA-CR-158784] N79-28101

LUNAR TIDES
Solar and lunar daily variation at low latitudes during quiet and disturbed days
[INPE-1435-RPE/011] N79-28088

LUNGS
Mechanics of mammalian lung
N79-27844
Respiration
N79-27845

M

MACH NUMBER
Calculation of pressure distribution for a wing-body combination at subsonic Mach numbers
[FFA-TN-AU-1091] N79-27110
Two-dimensional MHD channel design
[CONF-781234-1] N79-28000

MACH-ZEHNDER INTERFEROMETERS
Interferometric techniques and data evaluation methods for the utias 10 cm x 18 cm hypervelocity shock tube
[AD-A067957] N79-27187

MACROPHAGES
Preparation of guinea pig macrophage for electrophoretic experiments in space
[NASA-CR-158777] N79-27814

MAGNETIC ANOMALIES
Studies in modeling, reduction and filtering of potential field data
N79-27737
Central plane of the ring current responsible for geomagnetic disturbance in the South American region
[INPE-1482-RPE/029] N79-27746

MAGNETIC DIPOLES
Electromagnetic scattering by two-dimensional inhomogeneity due to an oscillating magnetic dipole
N79-27346

MAGNETIC EFFECTS
Influence of northern and southern hemisphere sq current systems on the equatorial region
[INPE-1434-RPE/010] N79-27747

MAGNETIC FIELDS
Design of high-perveance confined-flow guns for periodic-permanent-magnet-focused tubes
[NASA-TP-1485] N79-27400
High pressure arcs in SF6. Part 3: Influence of magnetic fields on circuit breaker arcs
[BMFT-FB-T-78-05-PT-3] N79-27421
Density and magnetic field measurements in the Tormac IV-c plasma
N79-27995
Some observable properties of crystalline electrons in magnetic fields: Exact results in model crystals
N79-28018
Depth profiling of the magnetic hyperfine field in ultra-thin films of iron
N79-28020
Research in space physics at the University of Iowa
[NASA-CR-158782] N79-28065

MAGNETIC MEASUREMENT
Development of a low drift SQUID magnetometer for geophysical applications
[GAMMA-32] N79-27759

MAGNETIC MOMENTS
Mossbauer study of Y[Fe(0.022)Co(0.978)2] from 259K to 0.18K using a stochastic model of magnetic ordering
N79-28014
On the possibility of determining the Venus magnetic moment from magnetic measurements in the tail
[PR-432] N79-28105

MAGNETIC POLES
Magnetic particles display matrix-address demonstrator
[AD-A067642] N79-27481

MAGNETIC PROPERTIES
Magnetic exchange interactions in copper(II) complexes propagated by extended bridging groups
N79-27263

MAGNETIC RESONANCE
Measurement of the rate constant for the NO + HO2 yields OH + NO2 reaction using laser magnetic resonance
[MPIS-8/1978] N79-27285
Research on elementary HO2 and OH radical reactions in the gas phase using laser magnetic resonance
[MPIS-10/1978] N79-27286

MAGNETIC RIGIDITY
The mean free path of low rigidity cosmic rays
[NASA-TM-80290] N79-28114

MAGNETIC STORMS
Geophysical disturbance effects on the state of the propagation medium and their predictability
N79-27391
Central plane of the ring current responsible for geomagnetic disturbance in the South American region
[INPE-1482-RPE/029] N79-27746

MAGNETIC SURVEYS
Spherical harmonic models of the geomagnetic field
[BULL-8] N79-27761

MAGNETIC TAPES
ORRC/SAIL interface control document for SAIL OFT data tapes, revision A
[NASA-TM-80479] N79-27873

MAGNETICALLY TRAPPED PARTICLES
Temperature measurements in the TORMAC 4-C plasma
N79-27993

MAGNETO-OPTICS
Magnetic effects in integrated optics
[LCR-494-292] N79-27982

MAGNETOHYDRODYNAMIC GENERATORS
Two-dimensional MHD channel design
[CONF-781234-1] N79-28000

MAGNETOHYDRODYNAMIC STABILITY
ELMO Bumpy Torus. Alternate concepts development program
[CONF-7810127-1] N79-27999
Local instabilities of Alfven waves in high speed streams
[LPS-78-2] N79-28111

MAGNETOHYDRODYNAMIC WAVES
Local instabilities of Alfven waves in high speed streams
[LPS-78-2] N79-28111

MAGNETOMETERS
Geodetic applications of inertial navigational systems
[AD-A067179] N79-27121
Referenced magnetotellurics with SQUIDS
N79-27742
An introduction to the AFGL Magnetometer network
[AD-A068979] N79-27752
Direct indicating proton magnetometer
[GAMMA-31] N79-27758
Development of a low drift SQUID magnetometer for geophysical applications
[GAMMA-32] N79-27759

MAGNETOSPHERE
Energetic electron fluxes in the earth's outer magnetosphere according to observations from the Prognoz-3 station
[PR-415] N79-27763
Magnetic field studies at Jupiter by Voyager 1: Preliminary results
[NASA-TM-80288] N79-28104

MAGNITUDE
Reevaluation of modified Mercalli intensity scale for earthquakes using distance as determinant
[PB-294439/5] N79-27767
Magnitude estimation as a hearing aid selection procedure
N79-27838

MAINTAINABILITY
Reliability and maintainability evaluation of freezing in solar systems
[ANL/SDP/TM-78-3] N79-27674
Design improvements simplify remote maintenance of tokamaks --- conferences
[CONF-781105-86] N79-28003

MAMMALS
Mechanics of mammalian lung
N79-27844

MAN MACHINE SYSTEMS
The systemic principles of building a man-machine control staff --- functional analysis
N79-27861

MANAGEMENT INFORMATION SYSTEMS
Design development and implementation of data acquisition systems for photovoltaic tests and applications project
[COO-4094-24] N79-27672
Feasibility study of a computerized management information system for the NOAA Corps personnel system
[AD-A068578] N79-28047

MANAGEMENT METHODS
Assessment of load management on the electric power system --- conferences
[CONF-781182-3] N79-27412
Alternative, semi-automated method for performing multiobjective analyses
[BNL-50892] N79-27921
Waste management
[DPST-78-125-2] N79-27964

MANAGEMENT PLANNING
Federal photovoltaic utilization program. Planning resource document
[HCP/M50081-01] N79-27706

MANGANESE
A biogeochemical study of manganese in the estuarine zone
N79-27805

MAPPING
Electrical group impedance measurements in the United States between 200 and 415 kHz
[AD-A068088] N79-27352
Pershing 2 alternate altimeter replacement scheme
[AD-A068168] N79-27483
MARINE CHEMISTRY
A biogeochemical study of manganese in the estuarine zone
N79-27805
MARINE METEOROLOGY
An experimental system to measure atmospheric extinction of visible, near and far infrared radiation in the marine boundary layer
[AD-A067557] N79-27751
MARKET RESEARCH
Review of selected solar market studies and techniques
[SERI/PR-52-076] N79-28056
MARKETING
Cargo Logistics Airlift Systems Study [CLASS]. Volume 3: Cross impact between the 1990 market and the air physical distribution systems, book 1
[NASA-CR-158914] N79-27112
Shale oil: Focus group results
[DOE/TIC-10019] N79-27644
Commercialization focus group interview: Electric/hybrid vehicles
[DOE/TIC-10008] N79-28064
MARKOV CHAINS
Experiments with a Markov chain dispersion model applied to vertical dispersion in the surface layer
N79-27569
MARS [PLANET]
On the reliability of heavy ion detection in the plasma flow near M
[PR-427] N79-28093
Mars section of remote sensing of basalts in the solar system. Chapter 2 of basaltic volcanism in the solar system
[RSL-221] N79-28097
MARS SURFACE SAMPLES
Consideration of sample return and the exploration strategy for Mars
[NASA-TM-58213] N79-28102
MASS DISTRIBUTION
Downstream laminar boundary layer with mass additions
N79-27442
MASS SPECTRA
Nonmetallic materials handbook. Volume 1: Epoxy materials
[NASA-CR-3133] N79-27307
SU[3] gauge theories of weak and electromagnetic interactions and strong interaction symmetry breaking
N79-27347
MASS SPECTROSCOPY
Mass spectrometric studies of some ions
N79-27257
Mass spectrometric investigation of the vaporization of sodium and potassium chromates: Preliminary results
[NASA-TM-79210] N79-27279
Potentialities for an improvement of the efficiency of fluorescent mercury lamps
[BMFT-FB-T-78-22] N79-27425
Studies of the Navy-ARPA Chemical Laser [NACL] exhaust
[AD-A068079] N79-27496
MASS TRANSFER
Hypersonic turbulent boundary layers with mass addition
N79-27445
Mass transport in arteries
N79-27848
MATERIALS RECOVERY
An evaluation of the reaction of cellulose with anhydrides/ammonia for the production of flame resistant cellulose derivatives
N79-27305
MATERIALS SCIENCE
Material science and solid state physics studies with positive muon spin precession --- fe[a1] alloys
[NASA-CR-158786] N79-28025
MATHEMATICAL MODELS
Combustor design criteria validation. Volume 1: Element tests and model validation
[AD-A067657] N79-27146
The unsteady aerodynamics of a cascade in translation
N79-27180
Unmodeled perturbation effect on the orbit determination accuracy
[PR-433] N79-27197
A thermal control approach for a solar electric propulsion thrust subsystem
[NASA-TM-79175] N79-27236
Introduction to composite materials. Volume 1: Deformation of unidirectional and laminated composites
[AD-A067544] N79-27248
Analytical study on the ideal response of normal-mode shock-depoled PZT ferroelectric ceramics with resistive, capacities, and inductive loads
[AD-A068552] N79-27312
Modeling of polymer networks for application to solid propellant formulating
[NASA-CR-158788] N79-27326
HF channel simulator for wideband signals deviative absorption and groundwave attenuation in the HF channel, addendum 1
[AD-A067906] N79-27359
Estimation of the parameters of an autoregressive process in the presence of additive white noise
[AD-A068749] N79-27363
Pressure on the interface between a converging fluid wedge and a fast fluid bottom
[AD-A067561] N79-27465
Reliability control model for stored items requiring rework
[AD-A067560] N79-27524
An improved version of the reactive plume model [RPM-II]
N79-27568
Representation of inter grid sources in pseudospectral dispersion models
N79-27572
Verification of the MADCAP model of photochemical air pollution in the San Diego air basin
N79-27573
The application of a mathematical model to the estimation of the concentrations of pollutants in European cities
N79-27586
Mathematical micromodel for local diffusion of carbon monoxide from motor vehicles
N79-27587
Air monitoring network design for power plant siting
N79-27590
Validation of the SO2 emission inventory for the Milan district area [50 X 60 km]
N79-27595
The Tergra model: A mathematical model for the simulation of the daily behavior of crop surface temperature and actual evapotranspiration
[REPT-1014] N79-27645
Some analytic models of passive solar building performance: A theoretical approach to the design of energy-conserving buildings
N79-27651
Comprehensive areal model of residential heating demands
[BNL-24998] N79-27692
A detailed parameterization of the atmospheric boundary layer
N79-27731
Evaluation of three constitutive models for soils
[AD-A068222] N79-27755
Computer modeling of atmospheric ice accretion
[AD-A068582] N79-27785
The digital simulation of areal salt transport to evaluate water management proposals in a coastal aquifer
N79-27803
Comparison of model and observed nearshore circulation
[ANL/EES-CP/22] N79-27808
Refinement and validation of a mathematical model of the human torso
N79-27841
ORRC/SAIL interface control document for SAIL OFT data tapes, revision A
[NASA-TM-80479] N79-27873
Strongly stable stationary solutions in nonlinear programs
[AD-A068903] N79-27884
Study of mathematical models of mutation and selection in multi-locus systems
[COO-2472-04] N79-27908
Dynamics of molecular photodissociation --- polyhalide molecules
N79-27940
Nonlinear models in Hamiltonian dynamics and statistical mechanics
N79-28034
MATHEMATICAL PROGRAMMING
Topics in mathematical programming. Research in nondifferentiable and discrete optimization
[AD-A067554] N79-27879
Generalized element method
[COO-2383-0055] N79-27906
MATHEMATICS
The third millenium roots of Babylonian mathematics. Part 1: A method for the decipherment, through mathematical and metrological analysis, of Proto-Sumerian and Proto-Elamite semi-pictograph inscriptions
[CTH-MATH-1978-9] N79-27910
MATRICES [MATHEMATICS]
Adjustment of large geodetic networks using a method for general sparse matrices
[SER-A-87] N79-27760
The existence of matrices with prescribed characteristic polynomials
N79-27887
On pointwise and analytic similarity of matrices
[AD-A068866] N79-27925
Calculation of functions of some particular matrices
[FUB-11-1977] N79-27926
MATRIX METHODS
Magnetic particles display matrix-address demonstrator
[AD-A067642] N79-27481
MATRIX THEORY
On pointwise and analytic similarity of matrices
[AD-A068866] N79-27925
Computation of H2O quadrupole moment matrix elements for pressure broadening calculations
[AD-A068569] N79-27945
MAXIMUM LIKELIHOOD ESTIMATES
Computer programs for scoring test data with item characteristic curve models
[AD-A067752] N79-27878
A modification of the likelihood equations for normal classes with field structure, preliminary report
[NASA-CR-160266] N79-27894
Local neighborhood transition probability estimation and its use in contextual classification
[NASA-CR-160261] N79-27916
Molecular thermodynamics of vapor-liquid and liquid-liquid equilibra --- maximum likelihood estimates
N79-28036
MEAN FREE PATH
The mean free path of low rigidity cosmic rays
[NASA-TM-80290] N79-28114
MEASURE AND INTEGRATION
Hardy classes on Riemann surfaces
N79-27923
MEASURING INSTRUMENTS
NOSC Metrology Laboratory: Capabilities summary
[AD-A068564] N79-27343
Effects of geometric variables on stress intensity factors for crack gages
[AD-A068631] N79-27533
Apparatus for rapid and precise surface area measurements of unconsolidated geologic materials
[BETC/RI-78/8] N79-27756
Techniques of measurement
N79-27850
MECHANICAL PROPERTIES
Advanced composites in sailplane structures: Application and mechanical properties
N79-27079
A study of the ordering and strengthening mechanisms in an off-stoichiometric Ni-Mo alloy
N79-27292
Analytical representation of mechanical properties data for 2 1/4 Cr-1 Mo steel
[CONF-781219-6] N79-27296
Assessment of materials for use in a solar ceramic receiver for chemical process heat
[ORNL/TM-6715] N79-27681
Carbon fiber behavior in an enclosed volume
[NASA-CR-159076] N79-27718
Some observable properties of crystalline electrons in magnetic fields: Exact results in model crystals
N79-28018
MEDICAL SCIENCE
Translations on USSR science and technology: Biomedical and behavioral sciences, no. 81
[JPRS-73729] N79-27860
MELTS [CRYSTAL GROWTH]
Viscosity and electrical conductivity of glass melts as a function of waste composition
[DP-MS-78-80] N79-27314
Cape York: The extraordinary mineralogy of an ordinary iron meteorite and its implication for the genesis of III AB irons
N79-28099
MEMBRANES
Transport studies of ion exchange membranes
N79-27268
Theory of interfacial and charge transport phenomena in membrane electrochemistry
N79-27272
Study of membrane reflector technology
[NASA-CR-158729] N79-27655
MERCURY [METAL]
Measurements of differential cross sections for electronic excitations on Na-Hg K-Hg, and Cs-Hg systems
[MPIS-13/1978] N79-27952
MERCURY AMALGAMS
Potentialities for an improvement of the efficiency of fluorescent mercury lamps
[BMFT-FB-T-78-22] N79-27425
MERCURY SPACECRAFT
Description of the TC 125 aboard the Mercury simulator
[NASA-TM-75479] N79-27198
MESONS
Quantum mechanics and quarkonium: An introductory review
[FERMILAB-CONF-78/82-THY] N79-28039
METABOLISM
Catecholamines and enzymes of metabolism thereof in the rat hypothalamus after flight aboard Cosmos-782 biosatellite
N79-27822

Tissular metabolism in mixed type fibers of rat skeletal muscles after flight aboard Cosmos-690 biosatellite
N79-27823
Effect of hyperbaric oxygen on peripheral blood neutrophil metabolism
N79-27830

METAL COATINGS
Exploratory development of resonant metal radomes
[AD-A067547] N79-27357

METAL FATIGUE
Impact damage on titanium leading edges from small hard objects
[AD-A068458] N79-27293

METAL FILMS
Depth profiling of the magnetic hyperfine field in ultra-thin films of iron
N79-28020

METAL HYDRIDES
Metal hydride solar heat pump and power system [HYCSOS]
[CONF-781133-5] N79-27675
Hydrogen diffusion and electronic structure parameters in tantalum hydrides determined by pulsed NMR measurements
[IS-M-178] N79-28029

METAL OXIDES
Bibliographical study of electrocatalysis involving mixed oxide compounds in an alkaline medium
[P/539/77/20] N79-27284

METAL SHEETS
Investigation on the effect the strain ratio has on sheet metal formability
N79-27291

METAL SURFACES
An exploratory investigation of the effect of a plastic coating on the profile drag of a practical-metal-construction sailplane airfoil
[NASA-TM-80092] N79-27098
Adhesive material transfer in the erosion of an aluminum alloy
[NASA-TM-79165] N79-27306
Energy transfer in anisotropic systems. A: Exciton migration in substitutionally disordered one-dimensional solids. B: The spectroscopy of molecules adsorbed on metal surfaces
N79-28010
Physical processes in positron scattering at metal surfaces
N79-28021

METAL WORKING
Investigation on the effect the strain ratio has on sheet metal formability
N79-27291

METAL-METAL BONDING
Orbital interactions in molecules studied by ultraviolet photoelectron spectroscopy --- ionization potentials and metal-metal bonding in transition metal carbonyl complexes
N79-27939

METALLOGRAPHY
Fracture toughness of fabrication welds investigated by metallographic methods
[CONF-780732-5] N79-27295

METAMORPHISM [GEOLOGY]
Thermodynamic analysis of equilibrium phase relations among minerals and aqueous solutions in metasomatic processes
N79-28033

METEOROLOGICAL BALLOONS
Engineering flight tests of range meteorological sounding system radiosonde
[AD-A067430] N79-27200

METEOROLOGICAL CHARTS
Meteorological and operational aspects of 46 clear air turbulent sampling missions with an instrumented B-57B aircraft. Volume 2, appendix C: Turbulence missions
[NASA-TM-80045] N79-27772
The 12824C lance, missile number 4661, round number 324 NPL
[AD-A067761] N79-27778

METEOROLOGICAL INSTRUMENTS
Investigation of near surface aerosol properties in arid regions
[AD-A068554] N79-27753

METEOROLOGICAL PARAMETERS
A climatology of meteorological parameters for short-range dispersion and long-range transport
N79-27577
Meteorological input data for the Vienna dispersion model
N79-27593
An algorithm for retrieval of ocean surface and atmospheric parameters from the observations of the scanning multichannel microwave radiometer [SMMR]
[NASA-TM-80277] N79-27635
A detailed parameterization of the atmospheric boundary layer
N79-27731
Meteorological and operational aspects of 46 clear air turbulent sampling missions with an instrumented B-57B aircraft. Volume 2, appendix C: Turbulence missions
[NASA-TM-80045] N79-27772
The 12831D Lance missile number 3306, round number 323, ESL
[AD-A067687] N79-27779
The 19303 GSRS. Missile number 1013, round number V-13,
[AD-A067686] N79-27780
Summary of Meteorological Observations, Surface [SMOS] Corpus Christi, Texas
[AD-A067679] N79-27781
Summary of Meteorological Observations, Surface [SMOS], Lakehurst, New Jersey
[AD-A067683] N79-27782

METEOROLOGICAL SATELLITES
Optimum interpolation of radiosonde and satellite-derived temperature fields
[PB-293017/0] N79-27798

METEOROLOGY
The 19702A GSRS missle number 10, round number, B-1, 6 February 1979
[AD-A067676] N79-27777
Summary of Meteorological Observations, Surface [SMOS], Imperial Beach, California
[AD-A067680] N79-27783
The application of atmospheric electricity concepts and methods to other parts of meteorology
[WMO-507] N79-27792
Solar energy information and data for Illinois
[PB-292712/7] N79-27800

METHANE
Methane production from beef cattle feedlots
[CONF-7806107-2] N79-27333

METHYL ALCOHOLS
Methanol from coal
N79-27619
An interferometric and multi-transitional study of the Orion methanol masers
N79-28070

METHYL COMPOUNDS
Chemiluminescence of dimethyldioxetane: Unimolecular generation of excited singlet and triplet acetone. Chemically initiated electron-exchange luminescence, the primary light generating reaction
[AD-A068920] N79-27281
IR laser induced dissociation of N2F4 and isomerization of CH3NC
[MPIS-12/1978] N79-27287

METROLOGY
NOSC Metrology Laboratory: Capabilities summary
[AD-A068564] N79-27343
The third millenium roots of Babylonian mathematics. Part 1: A method for the decipherment, through mathematical and metrological analysis, of Proto-Sumerian and Proto-Elamite semi-pictograph inscriptions
[CTH-MATH-1978-9] N79-27910

MICROANALYSIS
A microscopic, submicroscopic, and microseismic analysis of stable crack propagation and the effect of chemical environment on stable crack propagation in synthetic quartz
N79-28009

MICROCHANNELS
Studies of prototype high-gain micro-channel plate photomultipliers
[LBL-7957] N79-27410

MICROELECTRONICS
Etching of micropatterns over large areas using electron beam technology
[BMFT-FB-T-78-18] N79-27424

MICROFILMS
Human read - machine read microfilm mass memory system
[AD-A068892] N79-28051

MICROMETERS
NOSC Metrology Laboratory: Capabilities summary
[AD-A068564] N79-27343

MICROMINIATURIZATION
Etching of micropatterns over large areas using electron beam technology
[BMFT-FB-T-78-18] N79-27424

MICROORGANISMS
Microbial load monitor
[NASA-CR-160274] N79-27815
Characteristics of proteins of some unicellular organisms as potential components of ecological life support systems
N79-27834

MICROPHOTOGRAPHS
Human read - machine read microfilm mass memory system
[AD-A068892] N79-28051

MICROPROCESSORS
Software coding for reliable data communication in a reactor safety system
[OUEL-1264/78] N79-27379

MICROPROGRAMMING
Correcting memory of microcontrol system aided by a computer
[INPE-1489-TDL/009] N79-27874

MICROSCOPY
A microscopic, submicroscopic, and microseismic analysis of stable crack propagation and the effect of chemical environment on stable crack propagation in synthetic quartz
N79-28009

MICROSTRIP TRANSMISSION LINES
Microstrip antenna elements for use in hemispherically scanned arrays
[AD-A068566] N79-27366

MICROWAVE AMPLIFIERS
Monolithic microwave preamplifier
[AD-A063190] N79-27406
Component modelling of microwave transistors
[REPT-72/78/91-ISSUE-2] N79-27415

MICROWAVE EQUIPMENT
Design of automatic test equipment for developmental TWT's
[AD-A067553] N79-27404
Fifth European Specialist Workshop on Microwave Active Semiconductor Devices
[AD-A067492] N79-27405

MICROWAVE LANDING SYSTEMS
Theory and experiments on precision L-band DMF
[FUB-44-1977] N79-27124

MICROWAVE OSCILLATORS
The nonreciprocal directional filter, a multipurpose ferrite device
[INPE-1448-RPE/013] N79-27402

MICROWAVE RADIOMETERS
An algorithm for retrieval of ocean surface and atmospheric parameters from the observations of the scanning multichannel microwave radiometer [SMMR]
[NASA-TM-80277] N79-27635

MICROWAVES
Calculation of the attenuation as a function of rainfall intensity for several polarizations
[FUB-43-1977] N79-27382
Directional spectra of ocean waves from microwave backscatter: A physical optics solution with application to the short-pulse and two-frequency measurement techniques
[NASA-TM-80295] N79-27636
A model for the microwave emissivity of the ocean's surface as a function of wind speed
[NASA-TM-80278] N79-27640
Problems related to the assessment of safe exposure levels for radio frequency and microwave radiation
[ISS-P-78/7] N79-27855

MIDLATITUDE ATMOSPHERE
Effects of the liberation of the latent heat of condensation on the development of disturbances at median latitudes
[INPE-1438-TDL/005] N79-27776

MILITARY AIRCRAFT
Application of engine usage analysis to component life utilization
N79-27160

MILITARY HELICOPTERS
A flight investigation of basic performance characteristics of a teetering-rotor attack helicopter
[NASA-TM-80112] N79-27097

MILITARY TECHNOLOGY
Lasers: Their applications and operational requirements
N79-27494

MILLIMETER WAVES
Research in millimeter wave techniques
[NASA-CR-158785] N79-27350
Computation of attenuation and phase shift per unit length due to spherical rain drops
[FUB-24-1977] N79-27375

MINERALOGY
Mineralogy and chemistry of some unusual clay deposits in the Amargosa Desert, southern Nevada
N79-27623

MINERALS
Application of the unit regional value concept to a study of the mineral resources of Australia
N79-27624
Oxygen and hydrogen isotopic fractionation factors determined in experimental clay-water systems
N79-27740
Chemical interaction of aqueous solutions with epidote-feldspar mineral assemblages in geologic systems
N79-27741
Thermodynamic analysis of equilibrium phase relations among minerals and aqueous solutions in metasomatic processes
N79-28033

MIRRORS
Extreme ultraviolet diagnosis of a neutral-beam-heated mirror machine
N79-27994

MISSILE COMPONENTS
Pressure distributions on three different cruciform aft-tail control surfaces of a wingless missile at mach 1.60, 2.36, and 3.70 Volume I: Trapezoidal tail --- conducted in Langley Unitary Plan wind tunnel
[NASA-TM-80097] N79-27099

MISSILE CONFIGURATIONS
Missile configuration design options
N79-27208

MISSILE CONTROL
Missile Aerodynamics, volume 1 [VKI-LECTURE-SERIES-67-VOL-1] N79-27201
Thrust vector control N79-27206
Spoiler controls N79-27207
High incidence aerodynamics N79-27210
Planning, execution and statistical evaluation of hit simulations N79-27214
Noise adaptive filter N79-27216
Guidance and control for tactical guided weapons with emphasis on simulation and testing [AGARD-LS-101] N79-27225
New methods in the terminal guidance and control of tactical missiles N79-27228
Missile guidance techniques N79-27230
Testing of missile guidance and control systems N79-27231

MISSILE DESIGN
Missile Aerodynamics, volume 1 [VKI-LECTURE-SERIES-67-VOL-1] N79-27201
A brief review of air-flight weapons N79-27202
General weapon aerodynamics N79-27203
Aerodynamic controls N79-27204
Weapon/aircraft interactions N79-27205
Spoiler controls N79-27207
Missile configuration design options N79-27208
Base drag N79-27209
The consideration of wing-body and wing-tail interference in missile-design N79-27213
Tactical missile performance requirements: A methodology for development N79-27226

MISSILE SYSTEMS
Missile Aerodynamics, volume 2 [VKI-LECTURE-SERIES-67-VOL-2] N79-27211

MISSILE TRAJECTORIES
Wind field and trajectory models for tornado-propelled objects [NASA-CR-158775] N79-27091
Dynamics of the boost phase N79-27212

MISSILES
The application of ram-type engines to long-range surpersonic missiles N79-27215
The 19303 GSRS. Missile number 1013, round number V-13, [AD-A067686] N79-27780

MISSION PLANNING
Erectable space platform for space sciences and applications [NASA-CR-159091] N79-27217
Consideration of sample return and the exploration strategy for Mars [NASA-TM-58213] N79-28102

MISSOURI
Effect of phosphorus supply on algal biomass in a turbid Missouri Reservoir [PB-293183/0] N79-27816

MIXED CRYSTALS
Energy transfer in anisotropic systems. A: Exciton migration in substitutionally disordered one-dimensional solids. B: The spectroscopy of molecules adsorbed on metal surfaces N79-28010

MIXING
Wind mixing in lakes N79-27625
Carbon fiber behavior in an enclosed volume [NASA-CR-159076] N79-27718

MIXTURES
Stability of coal-oil mixtures --- conferences [CONF-7805152-1] N79-27332

MODELS
A review of energy models. Part 4: July 1978 [IIASA-RR-78-11-PT-4] N79-27652
Studies in modeling, reduction and filtering of potential field data N79-27737

MODES [STANDING WAVES]
Studies of discharge excited organic vapors for efficient laser emission [AD-A067512] N79-27495

MODULATION
Laser modulation of optical absorption in ZnSe [NASA-CR-158789] N79-27976

MOISTURE
Effects of moisture on torsion and flexure properties of graphite-epoxy composites [NASA-TM-78597] N79-27243

MOISTURE CONTENT
Relationship of red and photographic infrared spectral radiances to alfalfa biomass, forage water content, percentage canopy cover, and severity of drought stress [NASA-TM-80272] N79-27638
Remote sensing of leaf water content in the near infrared [NASA-TM-80291] N79-27639

MOLECULAR BEAMS
Crossed laser and molecular beam study of multiphoton dissociation of C2F5Cl [LBL-8090] N79-27498

MOLECULAR COLLISIONS
Semiclassical theory of electronically nonadiabatic transitions in molecular collision processes [NASA-CR-158776] N79-27944
Experimental and theoretical studies of integral excitation cross sections associated with alkali-rare gas collisions [MPIS-3/1978] N79-28005

MOLECULAR DIFFUSION
A plume dispersion study at Mildred Lake, Alberta N79-27581
Hydrogen diffusion and electronic structure parameters in tantalum hydrides determined by pulsed NMR measurements [IS-M-178] N79-28029

MOLECULAR ENERGY LEVELS
A survey of some recent mathematical results in atomic and molecular quantum mechanics N79-27938
Molecular thermodynamics of vapor-liquid and liquid-liquid equilibra --- maximum likelihood estimates N79-28036

MOLECULAR EXCITATION
Theoretical aspects of the resonant scattering of light by molecules N79-27943
Experimental and theoretical studies of integral excitation cross sections associated with alkali-rare gas collisions [MPIS-3/1978] N79-28005

MOLECULAR GASES
A study of the molecular complexes accompanying MON OB1 MON OB2 and CMA OB1 N79-28068
Transport properties in the atmosphere of Jupiter [NASA-CR-158783] N79-28100

MOLECULAR ORBITALS
Orbital interactions in molecules studied by ultraviolet photoelectron spectroscopy --- ionization potentials and metal-metal bonding in transition metal carbonyl complexes N79-27939

MOLECULAR PUMPS
InP and GaAs surface characterization with variable stoichiometry obtained by molecular spray. Applications to the manufacture of Schottky diodes [LCR-2270-DK] N79-27414
The use of molecular sprays in ultrahigh vacuum for GaAs monocrystalline growth applications [LCR-2251-DK-PT-1] N79-28031

MOLECULAR RELAXATION
A vibrational bias mechanism for diatomic dissociation: Induction times. steady rates, and activation energies N79-27255

MOLECULAR ROTATION
Light scattering studies of molecular motion in liquids N79-27972

MOLECULAR SPECTRA
Construction and setting up of a lamellar grating with a very wide spectral range and its use as a Fourier spectrometer for astrophysical measurements on large molecules [MPI-PAE/EXTRATERR-144] N79-27949

MOLECULAR SPECTROSCOPY
Energy transfer in anisotropic systems. A: Exciton migration in substitutionally disordered one-dimensional solids. B: The spectroscopy of molecules adsorbed on metal surfaces N79-28010

MOLECULAR STRUCTURE
The molecular morphology of polyethylene via nuclear magnetic resonance N79-27301

MOLECULAR WEIGHT
An ultracentrifugal analysis of polymer size and heat stability of carrageenan N79-27304

MOLECULES
A study of the molecular complexes accompanying MON OB1 MON OB2 and CMA OB1 N79-28068

MOLYBDENUM
Analytical representation of mechanical properties data for 2 1/4 Cr-1 Mo steel [CONF-781219-6] N79-27296
Dissolution processes of aluminum oxide on tungsten, iridium, molybdenum, tantalum, and rhenium as a function of electric field strength N79-28013

MOLYBDENUM ALLOYS
A study of the ordering and strengthening mechanisms in an off-stoichiometric Ni-Mo alloy N79-27292

MOMENTUM
Transverse momentum distributions in Drell-Yan processes [ILL-[TH]-79-22] N79-27897

MONITORS
Microbial load monitor [NASA-CR-160274] N79-27815

MONOPOLES
Fermion Hamiltonians with monopole and quadrupole pairing [LA-UR-79-241] N79-27947

MONOTONE FUNCTIONS
Recent developments in the numerical treatment of partial differential equations N79-27457
Some theorems and counterexamples in monotone approximation N79-27893

MONTE CARLO METHOD
A Monte Carlo approach to competition strategy --- for maximum lift and airspeed N79-27075
Investigation into computing the distribution of fatigue life by Monte-Carlo methods [LBF-FR-138] N79-27526

MOON
What's new on the moon? [NASA-EP-131] N79-28096

MORPHOLOGY
The molecular morphology of polyethylene via nuclear magnetic resonance N79-27301

MOSSBAUER EFFECT
Mossbauer study of Y[Fe(0.022)Co(0.978)2] from 259K to 0.18K using a stochastic model of magnetic ordering N79-28014

MOTOR VEHICLES
The 1980 motor gasoline supply and demand. Analysis memorandum AM/ES/79-12 [DOE/EIA-0102/32] N79-27337
Mathematical micromodel for local diffusion of carbon monoxide from motor vehicles N79-27587

MRCA AIRCRAFT
Dynamic pressure loads in the air induction system of the tornado fighter aircraft N79-27168

MULTICHANNEL COMMUNICATION
HF channel simulator for wideband signals deviative absorption and groundwave attenuation in the HF channel, addendum 1 [AD-A067906] N79-27359
A central multichannel coupler for connections between fiber optic bundles [LCR-14077] N79-27369

MULTIPATH TRANSMISSION
Identification of urban and rural multipath objects by means of a new measuring technique [FOA-C-30149-E2] N79-27378

MULTISPECTRAL PHOTOGRAPHY
Program library for handling and processing of remotely sensed multispectral data [FOA-C-30146-E1] N79-27646

MULTISTAGE ROCKET VEHICLES
Earth-to-orbit reusable launch vehicles: A comparative assessment [NASA-CR-157444] N79-27192

MUONS
Muon spin rotation [muon SR] [BNL-25216] N79-27946
Inclusive prompt muon and dimuon production by 28.5 GeV protons N79-27956
Material science and solid state physics studies with positive muon spin precession --- fe[al] alloys [NASA-CR-158786] N79-28025

MUSCULOSKELETAL SYSTEM
The combined effect of space flight factors and radiation on rat skeletal muscles N79-27821
Tissular metabolism in mixed type fibers of rat skeletal muscles after flight aboard Cosmos-690 biosatellite N79-27823

MUTATIONS
Study of mathematical models of mutation and selection in multi-locus systems [COO-2472-04] N79-27908

N

NACELLES
Determining the dynamic response due to an imbalance at the attachments of a motor on a pod --- caused by rotor blade loss
N79-27171
Ultrasonic inspection of engine nacelle structure searching for cracks
[REPT-7610.909] N79-27522
NASA PROGRAMS
State of the art survey of technologies applicable to NASA's aeronautics, avionics and controls program
[NASA-CR-159050] N79-27087
Sixty years of aeronautical research, 1917-1977 --- Langley Research Center
[NASA-EP-145] N79-27089
Earth winds, flow quality, and the minimum-protection inlet treatment for the NASA Ames 80- by 120-foot wind tunnel nonreturn circuit
[NASA-TM-78600] N79-27186
Description of the TC 125 aboard the Mercury simulator
[NASA-TM-75479] N79-27198
Extension, validation and application of the NASCAP code
[NASA-CR-159595] N79-27397
Department of Housing and Urban Development, independent agencies appropriation bill, 1980 --- congressional reports
[S-REPT-96-258] N79-28057
NASA JSC water monitor system: City of Houston field demonstration
[NASA-RP-1041] N79-28062
NASTRAN
The NASTRAN theoretical manual [level 16.0]
[NASA-SP-221[03]] N79-27531
NATURAL GAS
Synthetic natural gas in California: When and why --- from coal
N79-27615
Underground storage of natural gas by interstate pipeline companies for 1976 and winter 1976 - 1977
[DOE/EIA-0151] N79-27684
Midterm oil and gas supply modeling system methodology description
[DOE/EIA-0103/17] N79-28059
NAVIER-STOKES EQUATION
The solution of Navier-Stokes equations in the boundary layer
N79-27455
A split finite element algorithm for the compressible Navier-Stokes equations
N79-27463
Flow through a furrowed channel. Part 1: Calculated flow patterns
[OUEL-1273/78] N79-27472
NAVIGATION
Navigation and position determination
[FOA-A-20026-E3] N79-27122
Drive program documentation
[NASA-CR-160252] N79-27233
Aerospace propagation media modelling and prediction schemes for modern communications, navigation, and surveillance systems
[AGARD-LS-99] N79-27385
NAVY
Coal energy conversion options for Navy bases
[AD-A067463] N79-27667
NEAR FIELDS
Computer controlled near field measurements for testing steerable array antennas
[FFM-263] N79-27372
NEAR INFRARED RADIATION
Remote sensing of leaf water content in the near infrared
[NASA-TM-80291] N79-27639
NEBRASKA
Photovoltaic-powered irrigation experiments in the United States --- crop drying and irrigating in Nebraska
[COO-4094-28] N79-27673
Mead 25 kilowatt photovoltaic system --- conferences
[COO-4094-19] N79-27677
NERVES
Functional connections of the central auditory nervous system: Thalamocortical corticothalamic and corticotectal connections of the AI, AII and AAF auditory cortical fields
N79-27839
NERVOUS SYSTEM
Functional connections of the central auditory nervous system: Thalamocortical corticothalamic and corticotectal connections of the AI, AII and AAF auditory cortical fields
N79-27839
NETHERLANDS
Insolation measurements in and near an industrial region of the Netherlands
[KNMI-WR-78-14] N79-27727
Seismological bulletin of the seismograph stations in the Netherlands, volume 59, 1971
[KNMI-108-59] N79-27765
Precipitation, 1977
[KNMI-117-77] N79-27795
Average winter temperatures at De Bilt (the Netherlands): 1634 - 1977
[KNMI-V-305] N79-27796
Surface wind analysis overland in the Netherlands, based on an optimum interpolation method
[KNMI-WR-78-17] N79-27797
NETWORK ANALYSIS
An introduction to the AFGL Magnetometer network
[AD-A068979] N79-27752
Generalized element method
[COO-2383-0055] N79-27906
NETWORKS
Planning nets: A representation for formalizing analogies and semantic models of procedural skills
[AD-A067907] N79-28050
NEURONS
Biological effects of laser irradiation on nerve cells
N79-27840
NEUTRAL BEAMS
Extreme ultraviolet diagnosis of a neutral-beam-heated mirror machine
N79-27994
NEUTRINOS
Review of neutrino physics at Brookhaven
[BNL-25378] N79-27948
Extraterrestrial high energy neutrino fluxes
[NASA-TM-80304] N79-28116
NEVADA
Mineralogy and chemistry of some unusual clay deposits in the Amargosa Desert, southern Nevada
N79-27623
NEW ENGLAND [US]
Geology of the passive margin of New England
[PB-294473/4] N79-27768
NEW JERSEY
Summary of Meteorological Observations, Surface [SMOS]. Lakehurst, New Jersey
[AD-A067683] N79-27782
NEW YORK
Sulfur and nitrogen compounds in urban aerosols
[BNL-25223] N79-27723
An environmental assessment of sewerage centralization with special reference to New York State
N79-28061
NICKEL ALLOYS
A study of the ordering and strengthening mechanisms in an off-stoichiometric Ni-Mo alloy
N79-27292
Cyclic stress-strain behavior of ERNiCr-3 weld filler metal
[CONF-781202-31] N79-27535
NIOBIUM
A low temperature ultrasonic study of hydrogen in niobium
N79-28019
NITRATES
Search for low-lying triplet electronic states
[AD-A068465] N79-28028
NITRIC OXIDE
Measurement of the rate constant for the NO + HO2 yields OH + NO2 reaction using laser magnetic resonance
[MPIS-8/1978] N79-27285
NITROGEN DIOXIDE
Kinetics and magnetic field effects on laser induced fluorescence in NO2
N79-27256
NITROGEN FLUORIDES
IR laser induced dissociation of N2F4 and isomerization of CH3NC
[MPIS-12/1978] N79-27287
NITROGEN OXIDES
Status of NO sub x control for coal-fired power plants
N79-27609
Fluidized combustion of coal --- to limit SO2 and NOx emissions
N79-27613
NITROGEN TETROXIDE
High performance N2O4/amine elements blowapart
[NASA-CR-160272] N79-27323
High performance N2O4/amine elements blowapart
[NASA-CR-160273] N79-27324
NITROSO COMPOUNDS
Mechanistic studies in the organic solid state
N79-28008
NOISE (SOUND)
Noise adaptive filter
N79-27216
Noise in Turbomachines
[VKI-LECTURE-SERIES-81] N79-27509
Noise from industrial fans
N79-27511
The loudness of tinnitus
N79-27837
NOISE GENERATORS
A review on fundamentals of acoustic wave theory and noise generation
N79-27510
General introductory remarks. A: Noise from fluid ejectors. B: Pressure fluctuations generated in a circuit by flow singularities. C: Use of correlation technique to noise source detection problem
N79-27512
NOISE MEASUREMENT
The loudness of tinnitus
N79-27837
NOISE POLLUTION
Some remarks on the noise nuisances and the basis for future ECC regulations
N79-27513
NOISE PROPAGATION
Studies of the acoustic transmission characteristics of coaxial nozzles with inverted velocity profiles: Comprehensive data report --- nozzle transfer functions
[NASA-CR-159628] N79-27933
NOISE REDUCTION
Noise in Turbomachines
[VKI-LECTURE-SERIES-81] N79-27509
Acoustic silencers for inlet and exhaust of turbomachinery
N79-27514
Computation of minimum noise aircraft landing trajectories
[NASA-CR-158931] N79-27929
On the attenuation of sound by three-dimensionally segmented acoustic liners in a rectangular duct
[NASA-TM-80118] N79-27932
Analysis, design, and test of acoustic treatment in a laboratory inlet duct
[NASA-CR-3161] N79-27934
NOISE SPECTRA
Trailing edge noise data with comparison to theory
[NASA-TM-79208] N79-27930
NOISE TEMPERATURE
The apparent noise temperature of the earth as seen by a SARSAT spacecraft receiving antenna
[CRC-1323] N79-27355
NOMENCLATURES
Contemporary soaring nomenclature
N79-27085
NONADIABATIC CONDITIONS
Semiclassical theory of electronically nonadiabatic transitions in molecular collision processes
[NASA-CR-158776] N79-27944
NONDESTRUCTIVE TESTS
Nondestructive testing information analysis center, 1978
[AD-A068669] N79-27525
Characteristics of low loss optical fibers obtained from commercially available dielectrics
[FUB-21-1977] N79-27986
NONEQUILIBRIUM CONDITIONS
Effective difference method for solving non-stationary two dimensional hypersonic flow boundary layer problems under chemical nonequilibrium conditions
[KU-RZ-9/1977] N79-27104
The numerical solution of the nonsimilar laminar boundary-layer equations including the effects of nonequilibrium dissociation
N79-27440
NONEQUILIBRIUM THERMODYNAMICS
Derivation of the basic equations for non-equilibrium boundary layers
N79-27438
NONLINEAR EQUATIONS
Backward solution of nonlinear differential equations. Part 2: Nonlinear equations with forced functions
[FOA-C-20284-E3] N79-27909
NONLINEAR PROGRAMMING
Strongly stable stationary solutions in nonlinear programs
[AD-A068903] N79-27884
NONLINEAR SYSTEMS
Shock formation from discontinuities in the derivatives of solutions of nonlinear hyperbolic systems
[AD-A059201] N79-27090
Nonlinear models in Hamiltonian dynamics and statistical mechanics
N79-28034
NONLINEARITY
Space and time solution for two coupled intensity deviations from a stationary nonlinear state
N79-28004
A nonlinear hyperbolic volterra equation arising in heat flow
[AD-A068898] N79-28038
NONRELATIVISTIC MECHANICS
Quantum mechanics and quarkonium: An introductory review
[FERMILAB-CONF-78/82-THY] N79-28039
NORMAL DENSITY FUNCTIONS
Influence of the turbulence typing scheme upon the yearly average concentrations by means of a bi-Gaussian model
N79-27555
A modification of the likelihood equations for normal classes with field structure, preliminary report
[NASA-CR-160266] N79-27894
On optimal discriminants between two classes of random variables in terms of the moments of their distributions
[AD-A068551] N79-27904

Computation of the irregularity factor N sub 0/N sub 1 of a stationary Gaussian process with dual peak power spectral density
[LBF-TB-137] N79-27919
NORMS
Analysis of finite element methods for second order boundary value problems using mesh dependent norms
[AD-A068902] N79-27903
NORTH DAKOTA
Heat flow and heat production studies in North Dakota
N79-27649
NORTH SEA
A comparison of surface diffusion of air pollutants over water and land [an artificial island in the North Sea]
[KNMI-WR-78-13] N79-27790
Wind and wave climate in the Netherlands sector of the North Sea between 53 deg and 54 deg north latitude
[KNMI-WR-78-9] N79-27791
NORTHERN HEMISPHERE
Influence of northern and southern hemisphere sq current systems on the equatorial region
[INPE-1434-RPE/010] N79-27747
NOTCH TESTS
Calculation of stress concentrations in disc alveoles --- viscoplasticity of turbine disks
N79-27157
Experimental and analytical study of fatigue damage in notched graphite/epoxy laminates
[NASA-TM-80121] N79-27245
NOZZLE DESIGN
YF-17/ADEN system study
[NASA-CR-144882] N79-27126
NOZZLE FLOW
Formation of dimers in rare gas beams from nozzles
[MPIS-5/1978] N79-27950
NUCLEAR ELECTRIC POWER GENERATION
Nuclear powered satellite studies
[COO-4045-3] N79-27221
NUCLEAR EXPLOSIONS
Seismological recordings of nuclear explosions in 1976 obtained at the Hagfors observatory in Sweden
[FOA-C-20275-11] N79-27764
NUCLEAR FUSION
Lasers: Their applications and operational requirements
N79-27494
On the origin of the elements: A brief review
[INPE-1466-RPE/019] N79-28087
NUCLEAR INTERACTIONS
Review of neutrino physics at Brookhaven
[BNL-25378] N79-27948
NUCLEAR MAGNETIC RESONANCE
The molecular morphology of polyethylene via nuclear magnetic resonance
N79-27301
Hydrogen diffusion and electronic structure parameters in tantalum hydrides determined by pulsed NMR measurements
[IS-M-178] N79-28029
NUCLEAR PHYSICS
The nuclear and atomic physics governing changes in the composition of relativistic cosmic rays
N79-28112
NUCLEAR REACTORS
Physics of reactor safety
[PB-293662/3] N79-27971
NUCLEAR STRUCTURE
Nuclear structure theory
[COO-2171-182] N79-27959
Nuclear structure at intermediate energies
[ORO-1316-201] N79-27966
NUCLEI [NUCLEAR PHYSICS]
Inclusive prompt muon and dimuon production by 28.5 GeV protons
N79-27956
Nuclear structure theory
[COO-2171-182] N79-27959
Nuclear structure at intermediate energies
[ORO-1316-201] N79-27966
NUCLEOGENESIS
On the origin of the elements: A brief review
[INPE-1466-RPE/019] N79-28087
NUCLEON-NUCLEON INTERACTIONS
Nuclear structure at intermediate energies
[ORO-1316-201] N79-27966
NUCLEON-NUCLEON SCATTERING
High energy behavior of pion-nucleon-scattering partial waves from amplitude analysis
[REPT-78] N79-27969
NUMERICAL ANALYSIS
Electromagnetic scattering by two-dimensional inhomogeneity due to an oscillating magnetic dipole
N79-27346
The numerical solution of the nonsimilar laminar boundary-layer equations including the effects of nonequilibrium dissociation
N79-27440
Numerical Methods in Fluid Dynamics
[VKI-LECTURE-SERIES-44] N79-27448
Numerical methods in fluid dynamics, introductory remarks
N79-27449
The marker-and-cell method
N79-27451
The particle in-cell method
N79-27452
Recent developments in the numerical treatment of partial differential equations
N79-27457
Advanced theory of the Stirling cycle digital simulation of regenerative engine operation
N79-27504
Numerical and software requirements for general nonlinear finite element analysis
N79-27527
Numerical simulation of VTPR temperature retrievals in a severe storm environment
[NASA-CR-158761] N79-27770
Changes in the weather: An objective approach
[KNMI-WR-78-10] N79-27788
NUMERICAL CONTROL
Computer controlled near field measurements for testing steerable array antennas
[FFM-263] N79-27372
NUMERICAL WEATHER FORECASTING
On the calculation of large scale vertical circulation using a three parameter quasigeostrophic numerical model
[KNMI-WR-78-12] N79-27789

O

OBSERVATORIES
Tectonic motion site survey of the National Radio Astronomy Observatory, Green Bank, West Virginia
[NASA-TM-79691] N79-27748
OCEAN BOTTOM
The Sea-Beam: A multi-beam echo-sounder installed on the oceanographic ship 'Jean Charcot'
[CNEXO-STR-37] N79-27810
OCEAN CURRENTS
Expendable bathythermograph observations from NMFS/MARAD Ship of Opportunity program for 1975
[PB-294215/9] N79-27811
OCEAN DATA ACQUISITIONS SYSTEMS
Ocean Thermal Energy Conversion [OTEC] platform configuration and integration. Volume 2: Conceptual design
[DOE/ET/4064-1-VOL-2] N79-27697
The Sea-Beam: A multi-beam echo-sounder installed on the oceanographic ship 'Jean Charcot'
[CNEXO-STR-37] N79-27810
OCEAN MODELS
Solar radiation absorption studies in the atmosphere and ocean using a two stream method
[MITT-25] N79-27620
A model for the microwave emissivity of the ocean's surface as a function of wind speed
[NASA-TM-80278] N79-27640
OCEAN SURFACE
An algorithm for retrieval of ocean surface and atmospheric parameters from the observations of the scanning multichannel microwave radiometer [SMMR]
[NASA-TM-80277] N79-27635
A model for the microwave emissivity of the ocean's surface as a function of wind speed
[NASA-TM-80278] N79-27640
Shape of the ocean surface and implications for the Earth's interior
N79-27804
OCEAN THERMAL ENERGY CONVERSION
Ocean Thermal Energy Conversion [OTEC] platform configuration and integration. Volume 2: Conceptual design
[DOE/ET/4064-1-VOL-2] N79-27697
Statistical nature of cold fronts within the Gulf of Mexico and their potential influence on OTEC operations
[PNL-2878] N79-27786
OCEANOGRAPHIC PARAMETERS
Oceanographical observations from Danish light-vessels and coastal stations
[ISBN-87-7478-151-0] N79-27809
OCEANOGRAPHY
A comparison of simulated and experimental wave spectra in the nearshore region
[NASA-TM-80478] N79-27806
Expendable bathythermograph observations from NMFS/MARAD Ship of Opportunity program for 1975
[PB-294215/9] N79-27811
OIL ADDITIVES
Auger spectroscopy analysis of lubrication with zinc dialkyldithiophosphate of several metal combinations in sliding contact
[NASA-TP-1489] N79-27308
OIL EXPLORATION
North Stanley Polymer Demonstration Project
[BETC/RI-78/19] N79-27313
Re-examination of undiscovered oil resources in the United States
[DOE/EIA-0103/9] N79-27643
OIL SLICKS
Amoco Cadiz: Preliminary observations of the oil spill impact on the marine environment --- conference proceedings, Brest, 7 Jun. 1978
[CNEXO-6-1978] N79-27726
OILS
Kinetics of coal liquefaction to preasphaltenes, asphaltenes and oils
N79-27320
Thermodynamic methods for determining losses in hydraulic components: A survey
[NEL-657] N79-28042
Relationship of PVT conditions and specific heat capacity of oils for thermodynamic measurements
[NEL-658] N79-28043
OPERATING SYSTEMS [COMPUTERS]
Correcting memory of microcontrol system aided by a computer
[INPE-1489-TDL/009] N79-27874
Roscoe user guide, version 1.1
[AD-A068864] N79-27883
OPERATIONS RESEARCH
Reliability control model for stored items requiring rework
[AD-A067560] N79-27524
OPERATORS [MATHEMATICS]
The existence of matrices with prescribed characteristic polynomials
N79-27887
On rational approximations of groups of operators
[CTH-MATH-1978-10-1] N79-27911
OPTICAL COMMUNICATION
Optical communication and detection through optical scattering channels
N79-27390
Aircraft fiber-optic interconnect systems project
[AD-A068366] N79-27978
OPTICAL DATA PROCESSING
Optical treatment of information
[FUB-17-1977] N79-27374
OPTICAL DATA STORAGE MATERIALS
Study of electrical optical materials having increased photosensitivity
[LCR-77-32/R/G.5] N79-27983
OPTICAL EQUIPMENT
Simultaneous determination of the components xi and eta of the deviation from the vertical with an astrolab prism: Part Vb: Observations at 48deg latitude during 1972
[SER-B-199-MITT-143] N79-28079
OPTICAL FILTERS
Study of a method for filtering optical images
[BNWL-TR-342] N79-27980
OPTICAL MEASUREMENT
Response characteristics of Knollenberg light-scattering aerosol counters
[AD-A067701] N79-27750
Measurement of optical fibers attenuation by the reflectometric method: Experimental apparatus and attainable accuracy
[FUB-16-1977] N79-27985
Characteristics of low loss optical fibers obtained from commercially available dielectrics
[FUB-21-1977] N79-27986
Measurements of characteristic parameters of an optical fiber
[FUB-22-1977] N79-27987
OPTICAL MEMORY [DATA STORAGE]
Human read - machine read microfilm mass memory system
[AD-A068892] N79-28051
OPTICAL PROPERTIES
Optical properties of Si and Ge Schottky barrier photodectectors and light waveguides. Research with reference to optical fiber communication
[VTT-ENT-23] N79-27981
Optical materials characterization
[PB-292245/8] N79-27990
OPTICAL RADAR
Correlation techniques and optimum signal methods in laser optics radar systems and practical measurement technique possibilities
[ILR-33] N79-27499
Stack plume characterization and model assessment with lidar data
N79-27562
OPTICAL REFLECTION
Measurement of optical fibers attenuation by the reflectometric method: Experimental apparatus and attainable accuracy
[FUB-16-1977] N79-27985
OPTICAL RESONANCE
X-ray excited optical luminescence of poly-nuclear aromatic hydrocarbons
N79-27266
OPTICAL RESONATORS
Static and dynamic frequency: Temperature characteristics of quartz vibrators
[AD-A068630] N79-27409
OPTICAL TRANSFER FUNCTION
Suppression of scattered light
N79-27973

OPTICAL WAVEGUIDES
Optical properties of Si and Ge Schottky barrier photodectectors and light waveguides. Research with reference to optical fiber communication
[VTT-ENT-23] N79-27981
Magnetic effects in integrated optics
[LCR-494-292] N79-27982
OPTIMAL CONTROL
Study of the theoretical to real correspondance of an optimal control model and the significance of this model for the description of working methodology with partly automated aircraft guidance and control systems
[ILR-35] N79-27184
OPTIMIZATION
Leading-edge slat optimization for maximum airfoil lift
[NASA-TM-78566] N79-27100
Extension of running time in the RAE hypersonic shock tunnel
[OUEL-1260/78] N79-27191
Optimization of the noise to signal ratio in a single photon counting photomultiplier
[LPS-78-6] N79-27381
Optimum interpolation of radiosonde and satellite-derived temperature fields
[PB-293017/0] N79-27798
Topics in mathematical programming. Research in nondifferentiable and discrete optimization
[AD-A067554] N79-27879
Proposal for a modification of SPICA
[REPT-78-112] N79-28006
ORBITAL POSITION ESTIMATION
Unmodeled perturbation effect on the orbit determination accuracy
[PR-433] N79-27197
ORBITALS
A systematic determination of extended atomic orbital basic sets and application to molecular SCF and MCSCF calculations
N79-27941
ORBITER PROJECT
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160271] N79-27349
ORGANIC COMPOUNDS
Multidimensional high resolution gas liquid chromatography in trace organic analysis: Heartcutting with intermediate trapping
N79-27273
The synthesis of organic reagents for the trace analysis of air pollutants
N79-27714
ORIFICE FLOW
Pulsatile flow through an orifice
[PB-292194/8] N79-27475
ORION CONSTELLATION
An interferometric and multi-transitional study of the Orion methanol masers
N79-28070
OROGRAPHY
The effect of an arbitrary topography on compressible, stably stratified, vertically sheared flow on the Beta plane
N79-27802
ORTHOSTATIC TOLERANCE
Simulation of fluid-electrolyte metabolism as a means of preventing orthostatic instability in the crew of the second expedition aboard the Salyut-4 station
N79-27819
Evaluation of circulatory reactions in the head to antiorthostatic position
N79-27832
OVERVOLTAGE
Effect of silicate ions on electrode overvoltage
[P/539/77/24] N79-27413
OXIDATION
The oxidizing behavior of some platinum metal fluorides
N79-27261
Passivation of high voltage power devices by thermal oxidation
[BMFT-FB-T-78-23] N79-27426
Catalysis by platinum single crystal surfaces: Low pressure hydrocarbon reactions and the effects of introducing strongly bound oxygen at the surface
N79-28012
OXIDATION RESISTANCE
Modules of rupture and oxidation resistance of Si2.55Al0.6O0.72N3.52 sialon
[NASA-TP-1490] N79-27309
OXIDE FILMS
Interface and electron tunneling properties of thin oxides on silicon
N79-28023
OXIDES
Acidity distribution on oxide surfaces
N79-27258
OXYGEN
Thermoplastic materials corrosion in 40% KOH [120 C - 180 C]
[P/539/77/26] N79-27315
Helium-oxygen mixture and the organism hyperbaric aspect
N79-27818
Toxicity of oxygen mixed with helium
N79-27829
OXYGEN ISOTOPES
Oxygen and hydrogen isotopic fractionation factors determined in experimental clay-water systems
N79-27740
OZONE
A summary of research on the NASA-Global Atmospheric Sampling Program performed by the Atmospheric Sciences Research Center --- ozone transport theory
[NASA-CR-159614] N79-27716
Computer predictions of photochemical oxidant levels for initial precursor concentrations characteristic of southeastern Virginia
[NASA-TM-80111] N79-27717

P

PANELS
Flight service evaluation of Kevlar-49 epoxy composite panels in wide-bodied commercial transport aircraft
[NASA-CR-159071] N79-27246
PARABOLIC ANTENNAS
Feasibility of large orbital antennas
[DFH/DSP-032/78-VOL-2] N79-27377
PARALLAX
Simultaneous determination of the components xi and eta of the deviation from the vertical with an astrolab prism: Part Vb: Observations at 48deg latitude during 1972
[SER-B-199-MITT-143] N79-28079
PARALLEL FLOW
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 1: Numerical aspects
N79-27458
PARALLEL PROCESSING (COMPUTERS)
Massively parallel processor computer
[NASA-CASE-GSC-12223-1] N79-27864
PARAMETERIZATION
Parameterizing atmospheric diffusion
N79-27553
Documentation of a ground hydrology parameterization for use in the GISS atmospheric general circulation model
[NASA-CR-158766] N79-27632
PARATHYROID GLAND
Morphological distinctions of the rat thyroid and parathyroid following long-term space flights
N79-27835
PARTICLE ACCELERATORS
Surface flashover characteristics of alumina dielectric guide cathodes in an intense relativistic electron beam accelerator
N79-27955
PARTICLE BEAMS
Review of neutrino physics at Brookhaven
[BNL-25378] N79-27948
PARTICLE IN CELL TECHNIQUE
The particle in-cell method
N79-27452
PARTICLE INTERACTIONS
Interactions of heavy quarks in quantum chromodynamics
N79-28035
PARTICLE PRODUCTION
Inclusive prompt muon and dimuon production by 28.5 GeV protons
N79-27956
High energy physics studies. Part 1: Experimental program. Part 2: Theoretical program
[COO-1545-243] N79-27960
PARTICLE SPIN
Muon spin rotation [muon SR]
[BNL-25216] N79-27946
Material science and solid state physics studies with positive muon spin precession --- fe[a1] alloys
[NASA-CR-158786] N79-28025
PARTICLES
Colloid and other forces in particle adhesion and particle removal: A review
N79-27318
Acoustical particle sizing device
N79-27715
The 911 years of microparticle deposition at the South Pole: A climatic interpretation
N79-27732
PARTICULATE SAMPLING
Solvent Refined Coal [SRC] process: Environmental program. Volume 3: Pilot plant development work, part 5
[FE-0496-T8] N79-27329
Sulfur and nitrogen compounds in urban aerosols
[BNL-25223] N79-27723
PASSIVITY
A study of the conduction mechanisms in thin polymeric films with an application to the passivation of semiconductor components
N79-27399
Passivation of high voltage power devices by thermal oxidation
[BMFT-FB-T-78-23] N79-27426
PATTERN RECOGNITION
Ultrasonic pattern recognition study of intergranular stress corrosion cracks vs weld crown reflectors in SS piping
[EPRI-NP-891] N79-27297
Objective wind field pattern characterization
N79-27570
On optimal discriminants between two classes of random variables in terms of the moments of their distributions
[AD-A068551] N79-27904
Efficient feature subset selection with probabilistic distance criteria --- pattern recognition
[NASA-CR-160263] N79-27917
PERCEPTION
Shalit Perceptual Organisation and Reduction Questionnaire [SPORQ]: The instrument, design, administration and scoring
[FOA-C-55021-H6] N79-27859
PERFORMANCE
ECCM: Performance of radar signal design
[REPT-5-78] N79-27370
A consideration of measures and standards of performance of air quality simulation models
N79-27589
PERFORMANCE PREDICTION
Weapon delivery and its evaluation
N79-27227
PERFORMANCE TESTS
The DABS calibration performance monitoring equipment
[AD-A069126] N79-27120
Tactical missile performance requirements: A methodology for development
N79-27226
Testing of missile guidance and control systems
N79-27231
Integrated high frequency circuits
[BMFT-FB-T-78-24] N79-27427
Ceramic mainshaft roller bearing performance in a gas turbine engine
[AD-A067904] N79-27516
Thermal performance evaluation of the Semco [liquid] solar collector
[NASA-CR-161230] N79-27656
Indoor test for thermal performance evaluation of seven Elcam fin-tube solar collector configurations
[NASA-CR-161236] N79-27657
Test of concentrator solar array model for SEPS
[NASA-TM-78230] N79-27662
Aerodynamic performance of the 17-metre-diameter Darrieus wind turbine
[SAND-78-1737] N79-27670
Performance evaluation of a prototype relational data base handler for technical and scientific data processing
[FOA-C-20281-D8] N79-28054
PERIODIC VARIATIONS
Spectral analysis using the Karhunen-Loeve transform
[REPT-7-78] N79-27922
PERSONNEL MANAGEMENT
Feasibility study of a computerized management information system for the NOAA Corps personnel system
[AD-A068578] N79-28047
PERTURBATION
Effects of the liberation of the laten t heat of condensation on the development of disturbances at median latitudes
[INPE-1438-TDL/005] N79-27776
PERTURBATION THEORY
Exchange perturbation theories applied to electron-hydrogen atom scattering
N79-27942
Propagation of fermions in [A sub 0]=0 gauge
N79-27957
Gauge invariant perturbation theory in spatially homogeneous cosmology
N79-28086
PETROLEUM PRODUCTS
Findings and views concerning the exemption of kerojet fuels from the mandatory petroleum allocation and price regulations
[DOE/ERA-0023] N79-28058
PH
Relationship between pH value and electrolyte composition of precipitation
[ANL-TRANS-1149] N79-27721
PHARMACOLOGY
Study of pharmaceutical industrial problems
[NASA-CR-160267] N79-27852
PHASE DIAGRAMS
Thermodynamic analysis of equilibrium phase relations among minerals and aqueous solutions in metasomatic processes
N79-28033
PHASE SHIFT
Tropospheric limitations on the accuracy of phase measurement of coordinates in astronomy
[NASA-TM-75480] N79-28073
PHASE TRANSFORMATIONS
Diphenyl ether triple point cells
[NPL-CHEM-86] N79-27289

Transitions above the glass transition temperature in amorphous polymers
N79-27299
On the use of the photoacoustic effect for investigating phase-transitions in solids
[INPE-1476-RPE/027] N79-28026

PHONONS
The scattering of thermal phonons by extended defects in dielectric crystals
N79-28017

PHOSPHORESCENCE
X-ray excited optical luminescence of poly-nuclear aromatic hydrocarbons
N79-27266

PHOSPHORIC ACID
Advanced technology fuel cell program --- molten carbonate and phosphoric acid fuel cells and coal utilization in power plants
[EPRI-EM-956] N79-27702

PHOSPHORUS
Effect of phosphorus supply on algal biomass in a turbid Missouri Reservoir
[PB-293183/0] N79-27816

PHOTOCHEMICAL OXIDANTS
The ratio of peak 1-hour average concentrations to peak concentrations of other averaging times for various pollutants and differing sources
N79-27582

PHOTOCHEMICAL REACTIONS
Laser photochemical reaction dynamics in formaldehyde
N79-27274
Verification of the MADCAP model of photochemical air pollution in the San Diego air basin
N79-27573
Regional transport and photochemical model of atmospheric sulfates
N79-27575
Computer predictions of photochemical oxidant levels for initial precursor concentrations characteristic of southeastern Virginia
[NASA-TM-80111] N79-27717
Mechanistic studies in the organic solid state
N79-28008

PHOTODISSOCIATION
Crossed laser and molecular beam study of multiphoton dissociation of C2F5Cl
[LBL-8090] N79-27498
Dynamics of molecular photodissociation --- polyhalide molecules
N79-27940

PHOTOELASTIC ANALYSIS
The contribution of photoelasticity measurement to the study of turbine parts
N79-27152

PHOTOELECTRIC EFFECT
Study of electrical optical materials having increased photosensitivity
[LCR-77-32/R/G.5] N79-27983

PHOTOELECTRIC EMISSION
High-resolution EPR and piezospectroscopy studies of the lithium-oxygen donor in germanium
[LBL-8429] N79-27283

PHOTOELECTRON SPECTROSCOPY
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
N79-27264

PHOTOLITHOGRAPHY
Monolithic 20w 2GHz transistor and monolithic 5w 4GHz transistor
[AD-A068165] N79-27408

PHOTOLYSIS
Laser photochemical reaction dynamics in formaldehyde
N79-27274

PHOTOMETERS
Optical properties of Si and Ge Schottky barrier photodectectors and light waveguides. Research with reference to optical fiber communication
[VTT-ENT-23] N79-27981

PHOTOMULTIPLIER TUBES
Optimization of the noise to signal ratio in a single photon counting photomultiplier
[LPS-78-6] N79-27381
Studies of prototype high-gain micro-channel plate photomultipliers
[LBL-7957] N79-27410

PHOTON BEAMS
Optimization of the noise to signal ratio in a single photon counting photomultiplier
[LPS-78-6] N79-27381
Crossed laser and molecular beam study of multiphoton dissociation of C2F5Cl
[LBL-8090] N79-27498

PHOTONS
Two-photon reradiation from laser protective materials
[AD-A068466] N79-27497
Transverse momentum distributions in Drell-Yan processes
[ILL-(TH)-79-22] N79-27897

PHOTOOXIDATION
Photosensitized oxidation of unsaturated polymers
[NASA-TM-78604] N79-27241

PHOTOSENSITIVITY
Photosensitized cationic polymerization
N79-27302

PHOTOSYNTHESIS
Algal growth kinetics in bioconversion of solar energy
N79-27650
Applications of chlorophyll fluorescence transient measurements to the functional analysis of photosynthetic processes
N79-27813

PHOTOVOLTAIC CELLS
Endurance and soil accumulation testing of photovoltaic modules at various MIT/LL test sites
[COO-4094-23] N79-27671
Mead 25 kilowatt photovoltaic system --- conferences
[COO-4094-19] N79-27677
Design guidelines for large photovoltaic arrays
[SAND-79-7001] N79-27698

PHOTOVOLTAIC CONVERSION
Design development and implementation of data acquisition systems for photovoltaic tests and applications project
[COO-4094-24] N79-27672
Mead 25 kilowatt photovoltaic system --- conferences
[COO-4094-19] N79-27677
A 10-kilowatt photovoltaic concentrator array
[SAND-78-7024] N79-27699
Federal photovoltaic utilization program. Planning resource document
[HCP/M50081-01] N79-27706

PHOTOVOLTAIC EFFECT
Photovoltaic-powered irrigation experiments in the United States --- crop drying and irrigating in Nebraska
[COO-4094-28] N79-27673

PHYSIOLOGICAL EFFECTS
Possibilities of preventing adverse reactions in simulating the acute period of adaptation to weightlessness
N79-27825

PHYSIOLOGICAL FACTORS
Some remarks on the noise nuisances and the basis for future ECC regulations
N79-27513

PHYSIOLOGY
Physiological fluid dynamics
[VKI-LECTURE-SERIES-32] N79-27843

PIEZOELECTRICITY
High-resolution EPR and piezospectroscopy studies of the lithium-oxygen donor in germanium
[LBL-8429] N79-27283
The dependence of the piezoelectric response of poly[vinylidene] [vinylidene fluoride] on phase 1 volume fraction
[AD-A067961] N79-27310

PILOT PERFORMANCE
Balance training of the equilibrium organ and its effect on flight strategy
N79-27074

PILOT PLANTS
Solvent Refined Coal [SRC] process: Environmental program. Volume 3: Pilot plant development work, part 5
[FE-0496-T8] N79-27329
Evaluation of the flash desulfurization process for coal cleaning
[PB-292328/2] N79-27342
Status report the SRC-1 and SRC-2 processes
N79-27616

PILOT TRAINING
F-15 flight simulator: Development and analysis of computer scoring algorithm
[AD-A067765] N79-27188

PIPE FLOW
Study of the behavior of gas distribution equipment in hydrogen service update 1978
[CONF-781142-5] N79-27328

PIPELINES
Study of the behavior of gas distribution equipment in hydrogen service update 1978
[CONF-781142-5] N79-27328
Prospects for coal slurry pipelines in California
N79-27608

PIPES [TUBES]
Heat pipe qualification requirements --- spacecraft components
[ESA-PSS-49/TST-01-ESTEC] N79-27471
The buckling of short tubes under external pressure
[OUEL-1258/78] N79-27542

PISTON ENGINES
Energy-state formulation of lumped volume dynamic equations with application to a simplified free piston Stirling engine
[NASA-TM-79197] N79-27663

PISTONS
A long stroke isentropic free piston hypersonic wind tunnel
[AASU-334] N79-27190
Exhaust emissions characteristics of 5 aircraft piston engines
[AD-A069012] N79-27719

PITOT TUBES
A study of response time of pitot pressure probes designed for rapid response and protection of transducer
[NASA-TM-80091] N79-27462

PLANETARY COMPOSITION
Consideration of sample return and the exploration strategy for Mars
[NASA-TM-58213] N79-28102

PLANETARY EVOLUTION
Reports of planetary geology program, 1978 - 1979
[NASA-TM-80339] N79-28066

PLANETARY MAGNETIC FIELDS
Magnetic field studies at Jupiter by Voyager 1: Preliminary results
[NASA-TM-80288] N79-28104

PLANETARY RADIATION
Study on the ultraviolet radiation of the atmosphere of Venus --- veaera 11 and 12 observations
N79-28098
Voyager 1 planetary radio astronomy observations near Jupiter
[NASA-TM-80287] N79-28103

PLANKTON
Solar radiation absorption studies in the atmosphere and ocean using a two stream method
[MITT-25] N79-27620

PLASMA COMPOSITION
An EUV study of impurities in the Alcator A tokamak
N79-27996

PLASMA CONDUCTIVITY
ELMO Bumpy Torus. Alternate concepts development program
[CONF-7810127-1] N79-27999

PLASMA CONTROL
High beta plasmas in toroidal Surmacs
N79-27991
Temperature measurements in the TORMAC 4-C plasma
N79-27993
Extreme ultraviolet diagnosis of a neutral-beam-heated mirror machine
N79-27994
Density and magnetic field measurements in the Tormac IV-c plasma
N79-27995

PLASMA DENSITY
The growth of density fluctuations in a finite sized inhomogeneous plasma
N79-27992
Density and magnetic field measurements in the Tormac IV-c plasma
N79-27995

PLASMA DIAGNOSTICS
Extreme ultraviolet diagnosis of a neutral-beam-heated mirror machine
N79-27994

PLASMA FREQUENCIES
Langmuir turbulence and dissipation of high frequency energy
[PR-353] N79-28007

PLASMA INTERACTIONS
High voltage surface-charged environment test results from space flight and ground simulation experiments
[NASA-TM-79184] N79-27235

PLASMA PHYSICS
High beta plasmas in toroidal Surmacs
N79-27991
Research in space physics at the University of Iowa
[NASA-CR-158782] N79-28065

PLASMA PINCH
Proposal for a modification of SPICA
[REPT-78-112] N79-28006

PLASMA TEMPERATURE
Temperature measurements in the TORMAC 4-C plasma
N79-27993

PLASMA TURBULENCE
Langmuir turbulence and dissipation of high frequency energy
[PR-353] N79-28007

PLASMA WAVES
Langmuir turbulence and dissipation of high frequency energy
[PR-353] N79-28007

PLASMAS [PHYSICS]
Electromagnetic waves in free space
[INPR-1475-RPE/026] N79-27353
High beta plasmas in toroidal Surmacs
N79-27991
Macroscopic transport equations --- plasmas origin in kinetic theory
[INPE-1471-RPE/022] N79-27997
X-ray emission from CH2 laser-produced plasmas at 10 to the 16th power w/cm-2
[AD-A067517] N79-27998

PLASTIC COATINGS
An exploratory investigation of the effect of a plastic coating on the profile drag of a practical-metal-construction sailplane airfoil
[NASA-TM-80092] N79-27098

PLASTIC DEFORMATION
Response of structures to dynamic loading
[AD-A068567] N79-27534
PLATINUM
Catalysis by platinum single crystal surfaces: Low pressure hydrocarbon reactions and the effects of introducing strongly bound oxygen at the surface
N79-28012
PLATINUM COMPOUNDS
The oxidizing behavior of some platinum metal fluorides
N79-27261
PLOTTERS
GRAPH: An interactive computer program used for technical plotting
[AD-A068668] N79-27881
PLUMES
Physical modeling of plume dispersion in complex terrain: Neutral and stable atmosphere
N79-27544
Valley circulation influence on tall stack dispersion from a ridge location
N79-27545
Dispersion from chimneys downwind of cubical buildings: A wind-tunnel study
N79-27547
Field investigations of the dispersion of pollution across a ridge
N79-27548
Critical review of dispersion coefficients measured and applied in the Federal Republic of Germany
N79-27556
A comparative study of diffusion classification by lapse rate, gustiness and a modified Pasquill method
N79-27557
Stack plume characterization and model assessment with lidar data
N79-27562
Short-term dispersion from tall stacks
N79-27567
An improved version of the reactive plume model [RPM-II]
N79-27568
A plume dispersion study at Mildred Lake, Alberta
N79-27581
Sensitivity of a Gaussian plume model to the vertical dispersion parameters
N79-27585
PLUTONIUM
Radioactive wastes at the Hanford Reservation: A technical review
[COO-2708T004-1] N79-27963
PODS [EXTERNAL STORES]
Determining the dynamic response due to an imbalance at the attachments of a motor on a pod --- caused by rotor blade loss
N79-27171
POINT DEFECTS
A study of impurity and radiation induced point defects in MgAl2O4 [spinel]
N79-28015
POINT SOURCES
Point source air pollution modeling
N79-27574
POISSON EQUATION
Experiments with iterative methods for solving the discrete Poisson equation
[KNMI-WR-79-1] N79-27914
POLAR REGIONS
The 911 years of microparticle deposition at the South Pole: A climatic interpretation
N79-27732
The prototype low-energy telescope system for the international solar COSPIN experiment
[ESA-STR-202] N79-27989
The 10 February 1977 lunar occultation of Uranus. Radius, limb darkening, and polar brightening at 6900 A
[NASA-CR-158780] N79-28074
POLARITY
Analytical study on the ideal response of normal-mode shock-depoled PZT ferroelectric ceramics with resistive, capacities, and inductive loads
[AD-A068552] N79-27312
POLARIZATION [CHARGE SEPARATION]
Mass spectrometric studies of some ions
N79-27257
POLARIZED ELECTROMAGNETIC RADIATION
Calculation of the attenuation as a function of rainfall intensity for several polarizations
[FUB-43-1977] N79-27382
POLITICS
Guidance Simulation Techniques
N79-27229
POLLUTION CONTROL
Status of NO sub x control for coal-fired power plants
N79-27609
Economic comparison of fabric filters and electrostatic precipitators for particulate control on coal-fired utility boilers
N79-27610
Fluidized combustion of coal --- to limit SO2 and NOx emissions
N79-27613
POLLUTION MONITORING
A method of computing maximum ground-level concentrations of SO2 under prolonged stagnation conditions
N79-27546
Field investigations of the dispersion of pollution across a ridge
N79-27548
Air monitoring network design for power plant siting
N79-27590
On a calendar-time oriented systematic sampling plan in air quality monitoring
N79-27594
Theory of spectral radiance of pollutants at sea, volume 1
[NASA-CR-158791] N79-27633
Satellite passive remote sensing of off-shore pollutants, volume 2
[NASA-CR-158792] N79-27634
The synthesis of organic reagents for the trace analysis of air pollutants
N79-27714
A summary of research on the NASA-Global Atmospheric Sampling Program performed by the Atmospheric Sciences Research Center --- ozone transport theory
[NASA-CR-159614] N79-27716
International operations handbook for measurement of background atmospheric pollution
[WMO-491] N79-27724
NASA JSC water monitor system: City of Houston field demonstration
[NASA-RP-1041] N79-28062
POLYATOMIC MOLECULES
Dynamics of molecular photodissociation --- polyhalide molecules
N79-27940
POLYCRYSTALS
In depth study of the magnetocrystalline anisotropy of polycrystalline ferrimagnetic oxides
[LCR-1437/77] N79-28032
POLYESTERS
Foam-filled fiberglass radomes
[AD-A068672] N79-27249
An evaluation of the reaction of cellulose with anhydrides/ammonia for the production of flame resistant cellulose derivatives
N79-27305
POLYETHYLENES
The molecular morphology of polyethylene via nuclear magnetic resonance
N79-27301
POLYMER CHEMISTRY
Transitions above the glass transition temperature in amorphous polymers
N79-27299
The synthesis of some biodegradable polymers
N79-27300
An ultracentrifugal analysis of polymer size and heat stability of carrageenan
N79-27304
Modeling of polymer networks for application to solid propellant formulating
[NASA-CR-158788] N79-27326
POLYMERIC FILMS
A study of the conduction mechanisms in thin polymeric films with an application to the passivation of semiconductor components
N79-27399
POLYMERIZATION
Photosensitized cationic polymerization
N79-27302
POLYMERS
Photosensitized oxidation of unsaturated polymers
[NASA-TM-78604] N79-27241
The synthesis of some biodegradable polymers
N79-27300
The dependence of the piezoelectric response of poly[vinylidene] [vinylidene fluoride] on phase 1 volume fraction
[AD-A067961] N79-27310
New perfluoropolymer-forming reactions
[AD-A067568] N79-27311
North Stanley Polymer Demonstration Project
[BETC/RI-78/19] N79-27313
POLYNOMIALS
The existence of matrices with prescribed characteristic polynomials
N79-27887
Non-finitely based binary algebras derived from lattices
N79-27891
PONDS
Behavior of the thermal skin of cooling pond waters subjected to moderate wind speeds
[CONF-781213-3] N79-27722
POPULATION INVERSION
High-power gas lasers, volume 1
[VKI-LECTURE-SERIES-65-VOL-1] N79-27488
Gas dynamic lasers: Theory, experiment and the state-of-the-art
N79-27489
Introduction to physics of gas lasers
N79-27490
Chemical lasers
N79-27493
POSITION [LOCATION]
Identification of urban and rural multipath objects by means of a new measuring technique
[FOA-C-30149-E2] N79-27378
Locational response to regulatory policy: A regional analysis of energy facility location --- conferences
[BNL-23597] N79-27695
POSITRONS
Physical processes in positron scattering at metal surfaces
N79-28021
POTASSIUM CHROMATES
Mass spectrometric investigation of the vaporization of sodium and potassium chromates: Preliminary results
[NASA-TM-79210] N79-27279
POTASSIUM HYDROXIDES
Bibliographical study of electrocatalysis involving mixed oxide compounds in an alkaline medium
[P/539/77/20] N79-27284
POTENTIAL ENERGY
Transport properties in the atmosphere of Jupiter
[NASA-CR-158783] N79-28100
POTENTIAL FIELDS
Studies in modeling, reduction and filtering of potential field data
N79-27737
POWDER [PARTICLES]
Mixing and kinetic processes in pulverized coal combustors
[EPRI-FP-806-SY] N79-27330
POWER LINES
Basic research into the long duration behavior of insulating materials in SF6: Insulated transmission lines.
[BMFT-FB-T-78-09] N79-27423
POWER PLANTS
Results of SF6 tracer diffusion experiments next to a power plant
N79-27565
Grip-connected integrated community energy system. Phase 2: Detailed feasibility and preliminary design, stage 2
[COO-4337-2/2] N79-27701
POWER SPECTRA
Spectral analysis using the Karhunen-Loeve transform
[REPT-7-78] N79-27922
PREAMPLIFIERS
Monolithic microwave preamplifier
[AD-A063190] N79-27406
PRECESSION
Material science and solid state physics studies with positive muon spin precession --- fe[a1] alloys
[NASA-CR-158786] N79-28025
PRECIPITATION [CHEMISTRY]
A study of the ordering and strengthening mechanisms in an off-stoichiometric Ni-Mo alloy
N79-27292
PRECIPITATION [METEOROLOGY]
Relationship between pH value and electrolyte composition of precipitation
[ANL-TRANS-1149] N79-27721
Measurements of rainfall intensity: Instrumentation and data processing
[FOA-C-30157-E2,E1] N79-27794
Precipitation, 1977
[KNMI-117-77] N79-27795
PREDICTION ANALYSIS TECHNIQUES
The development of methods for predicting and measuring distribution patterns of aerial sprays
[NASA-CR-158787] N79-27092
Forecasting engine life
N79-27154
Reliability of steam turbine rotors
[EPRI-NP-923-SY] N79-27519
PRESSURE BROADENING
Computation of H2O quadrupole moment matrix elements for pressure broadening calculations
[AD-A068569] N79-27945
PRESSURE CHAMBERS
Reduction of particulate carryover from a pressurized fluidized bed
[NASA-TM-79216] N79-27664
PRESSURE DISTRIBUTION
Pressure distributions on three different cruciform aft-tail control surfaces of a wingless missile at mach 1.60, 2.36, and 3.70 Volume 1: Trapezoidal tail --- conducted in Langley Unitary Plan wind tunnel
[NASA-TM-80097] N79-27099
Investigation of wall pressure fields beneath turbulent boundary layers
[MPIS-11/1978] N79-27108
Calculation of pressure distribution for a wing-body combination at subsonic Mach numbers
[FFA-TN-AU-1091] N79-27110
Some flow characteristics of conventional and tapered high pressure drop simulated seals
[NASA-TM-79192] N79-27460
Pressure on the interface between a converging fluid wedge and a fast fluid bottom
[AD-A067561] N79-27465
Two-dimensional MHD channel design
[CONF-781234-1] N79-28000

PRESSURE EFFECTS
Pressure contact use on high-power semiconductor devices free of thermal fatigue
[BMFT-FB-T-78-02] N79-27418
Possibilities of preventing adverse reactions in simulating the acute period of adaptation to weightlessness
N79-27825
Probability of caisson disease while wearing a space suit when exiting from a spacecraft with an atmosphere close to that of earth
N79-27826
PRESSURE GRADIENTS
Distortions, rotating stall and mechanical solicitations
N79-27177
PRESSURE MEASUREMENTS
A study of response time of pitot pressure probes designed for rapid response and protection of transducer
[NASA-TM-80091] N79-27462
PRESSURE SENSORS
Aeropropulsion systems test facility rake calibration test in tunnel A
[AD-A068975] N79-27189
PRESSURE VESSELS
Fracture toughness of fabrication welds investigated by metallographic methods
[CONF-780732-5] N79-27295
Stress-intensity factors for internal surface cracks in cylindrical pressure vessels
[NASA-TM-80073] N79-27532
PRIMARY BATTERIES
Two-thousand amp/hr primary lithiumthionylchloride cells: Test results
[FOA-C-30152-E5] N79-27710
PROBABILITY DISTRIBUTION FUNCTIONS
Efficient feature subset selection with probabilistic distance criteria --- pattern recognition
[NASA-CR-160263] N79-27917
PROBABILITY THEORY
On the least favorable configurations in certain two-stage selection procedures
[AD-A068671] N79-27918
PROBES
Eddy current probe gun
[TDB-312] N79-27416
PROBLEM SOLVING
The numerical solution of the nonsimilar laminar boundary-layer equations including the effects of nonequilibrium dissociation
N79-27440
Numerical Methods in Fluid Dynamics
[VKI-LECTURE-SERIES-44] N79-27448
Study of pharmaceutical industrial problems
[NASA-CR-160267] N79-27852
Strongly stable stationary solutions in nonlinear programs
[AD-A068903] N79-27884
A secretary problem with a random number of choices
[AD-A068186] N79-27902
Efficient feature subset selection with probabilistic distance criteria --- pattern recognition
[NASA-CR-160263] N79-27917
Decision making and problem solving with computer assistance
[FB-36] N79-28048
PROCUREMENT POLICY
Findings and views concerning the exemption of aviation gasoline from the mandatory petroleum allocation and price regulations
[DOE/ERA-0024] N79-27336
PRODUCT DEVELOPMENT
Development of a low cost heavy/medium duty automotive Stirling engine
N79-27506
Unique requirements for the cooperation of computation and design in the development of Stirling engines
N79-27508
Commercialization focus group interview: Electric/hybrid vehicles
[DOE/TIC-10008] N79-28064
PRODUCTION ENGINEERING
Engine/aircraft structural integration: An overview
N79-27167
Material and energy balances in the production of ethanol from wood --- conferences
[CONF-7806139-1] N79-27338
Application of the unit regional value concept to a study of the mineral resources of Australia
N79-27624
Midterm oil and gas supply modeling system methodology description
[DOE/EIA-0103/17] N79-28059
PRODUCTION MANAGEMENT
Production of hot water with the aid of solar energy: Conditions and costs
[SIB-R-83-1978] N79-27700
PROGRAM VERIFICATION [COMPUTERS]
Validation of CRSTER model air quality estimates for an industrial plant
N79-27583
Tests of the climatological dispersion model and Gaussian Models at the Strait of Canso and at Lingan, Nova Scotia
N79-27584
Sensitivity of a Gaussian plume model to the vertical dispersion parameters
N79-27585
A consideration of measures and standards of performance of air quality simulation models
N79-27589
PROGRAMMING LANGUAGES
The specification of a decompilation methodology for data flow schema
N79-27871
SFS: A file system supporting Pascal files. Design and specification
[NPL-DNACS-88] N79-28053
PROGRAMS
The comparison and coordination of national policies and programs in the energy research and development sector
[EUR-5911] N79-27653
PROJECT PLANNING
Using coal inside California for electric power
N79-27598
A large scale wind energy program for the state of California
N79-27648
PROJECTILES
Impact damage on titanium leading edges from small hard objects
[AD-A068458] N79-27293
PROPELLANT BINDERS
The utilization of a national polymer acquired for solid propellants used in space vehicles
[INPE-1473-RPE/024] N79-27325
PROPELLANT GRAINS
Response of a rocket motor to transverse blast loading
[AD-A068464] N79-27239
PROPULSION SYSTEM CONFIGURATIONS
Aerodynamics of a tilt-nacelle V/STOL propulsion system
[NASA-TM-78606] N79-27138
PROTEIN METABOLISM
Tissular metabolism in mixed type fibers of rat skeletal muscles after flight aboard Cosmos-690 biosatellite
N79-27823
PROTEINS
Characteristics of proteins of some unicellular organisms as potential components of ecological life support systems
N79-27834
PROTON PRECESSION
Direct indicating proton magnetometer
[GAMMA-31] N79-27758
PROTONS
Inclusive prompt muon and dimuon production by 28.5 GeV protons
N79-27956
PSYCHOLOGICAL TESTS
Shalit Perceptual Organisation and Reduction Questionnaire [SPORQ]: The instrument, design, administration and scoring
[FOA-C-55021-H6] N79-27859
PSYCHOMOTOR PERFORMANCE
The effect of a reclined sitting position on psychomotor performance during exposure to high, sustained +Gsub z acceleration
[FPRC-1362] N79-27856
The effect of acceleration and seat back angle on performance of a reaction time task
[FPRC-1364] N79-27857
PSYCHOPHYSICS
The effects of context on multidimensional spatial cognitive models
[NASA-TM-58219] N79-28045
PUBLIC HEALTH
Translations on USSR science and technology: Biomedical and behavioral sciences, no. 81
[JPRS-73729] N79-27860
PULMONARY CIRCULATION
Pulmonary circulation and microcirculation
N79-27849
PULMONARY FUNCTIONS
Pneumotachographic distinctions of external respiration in man in the presence of excess intrapulmonary pressure on ground level and at high altitudes
N79-27827
PULSE AMPLITUDE
Codification and decodification of the pulse amplitude originating from space radiation
[INPE-1430-NTE/146] N79-28117
PULSE CODE MODULATION
Video transmission with reduced information rate [picture compression]. A system with source coding for transmission of video signals for portrait videotelephone
[BMFT-FB-T-78-50] N79-27384
PULSE COMMUNICATION
Electronic components for high speed signal processing in fiber optical communication
[BMFT-FB-T-77-75] N79-27383
PULSE DURATION MODULATION
Buck/boost regulator
[NASA-CASE-GSC-12360-1] N79-27394
PULSED LASERS
Kinetics and magnetic field effects on laser induced fluorescence in NO2
N79-27256

Q

QUADRUPOLES
Computation of H2O quadrupole moment matrix elements for pressure broadening calculations
[AD-A068569] N79-27945
Fermion Hamiltonians with monopole and quadrupole pairing
[LA-UR-79-241] N79-27947
QUALITATIVE ANALYSIS
Cape York: The extraordinary mineralogy of an ordinary iron meteorite and its implication for the genesis of III AB irons
N79-28099
QUANTITATIVE ANALYSIS
Investigating software development approaches
[AD-A068742] N79-27880
QUANTUM ELECTRODYNAMICS
Propagation of fermions in [A sub 0]=0 gauge
N79-27957
QUANTUM MECHANICS
A survey of some recent mathematical results in atomic and molecular quantum mechanics
N79-27938
Interactions of heavy quarks in quantum chromodynamics
N79-28035
Quantum mechanics and quarkonium: An introductory review
[FERMILAB-CONF-78/82-THY] N79-28039
QUANTUM STATISTICS
Theoretical aspects of the resonant scattering of light by molecules
N79-27943
QUANTUM THEORY
Intervalence electron transfer in mixed-valence compounds
N79-27262
QUARKS
Interactions of heavy quarks in quantum chromodynamics
N79-28035
QUARTZ CRYSTALS
Static and dynamic frequency: Temperature characteristics of quartz vibrators
[AD-A068630] N79-27409
A microscopic, submicroscopic, and microseismic analysis of stable crack propagation and the effect of chemical environment on stable crack propagation in synthetic quartz
N79-28009
QUENCHING [ATOMIC PHYSICS]
Comments on the paper entitled the quenching of OH' in the atmosphere by Llewellyn, Long and Solheim
[INPE-1484-RPE/030] N79-27745

R

RADAR BEACONS
Discrete Address Beacon System [DABS] Air Traffic Control Radar Beacon System [ATCRBS] interference analysis
[AD-A068565] N79-27119
RADAR BEAMS
Platteville heating results: HF radar observations
[AD-A068163] N79-27361
RADAR DETECTION
ECCM: Performance of radar signal design
[REPT-5-78] N79-27370
RADAR IMAGERY
Remote sensoring of the southeast region of the state of Sao Paulo: A proposition of a methodology for the geological interpretation of SLAR images
[INPE-1461-NTE/148] N79-27356
RADAR SIGNATURES
Formation tracking, part 1: Basic theory and formation track initiation
[FFM-265] N79-27373
RADAR TRACKING
Formation tracking, part 1: Basic theory and formation track initiation
[FFM-265] N79-27373
RADIANCE
Theory of spectral radiance of pollutants at sea, volume I
[NASA-CR-158791] N79-27633
Relationship of red and photographic infrared spectral radiances to alfalfa biomass, forage water content, percentage canopy cover, and severity of drought stress
[NASA-TM-80272] N79-27638

RADIANT FLUX DENSITY
High pressure arcs in SF6. Part 2: Energy transport by radiation
[BMFT-FB-T-78-04-PT-2] N79-27420
A computer program for calculating infrared fluxes
[KNMI-WR-78-15] N79-27766
RADIATION ABSORPTION
Solar radiation absorption studies in the atmosphere and ocean using a two stream method
[MITT-25] N79-27620
RADIATION DETECTORS
Measurement of the spectral sensitivity of radiation detectors and detector systems in the vacuumultraviolet spectral range by using a wall stabilized Ar cascade arc according to Boldt as a standard radiator
[MPI-PAE/EXTRATERR-142] N79-27968
Codification and decodification of the pulse amplitude originating from space radiation
[INPE-1430-NTE/146] N79-28117
RADIATION DOSAGE
Dose-effect relationships for ultrasound irradiation of brain tissue
N79-27812
Problems related to the assessment of safe exposure levels for radio frequency and microwave radiation
[ISS-P-78/7] N79-27855
RADIATION EFFECTS
Effects of space environment on composites: An analytical study of critical experimental parameters
[NASA-CR-158767] N79-27244
Dose-effect relationships for ultrasound irradiation of brain tissue
N79-27812
The combined effect of space flight factors and radiation on rat skeletal muscles
N79-27821
RADIATION HARDENING
Total-dose radiation-hardened CMOS integrated circuits
[AD-A067975] N79-27403
RADIATION HAZARDS
Problems related to the assessment of safe exposure levels for radio frequency and microwave radiation
[ISS-P-78/7] N79-27855
RADIATION INJURIES
Acceptable radiation levels in the ultraviolet visible infrared regions
[IZF-1978-15] N79-27853
RADIATION MEASUREMENT
Measurement of the spectral sensitivity of radiation detectors and detector systems in the vacuumultraviolet spectral range by using a wall stabilized Ar cascade arc according to Boldt as a standard radiator
[MPI-PAE/EXTRATERR-142] N79-27968
Particulate radioactivity, mainly from nuclear explosions, in air and precipitation in Sweden, mid-year 1975 to mid-year 1977
[FOA-C-40089-T2[A1]] N79-27970
RADIATION PROTECTION
Advice on the setting up of a workshop for treating tritium gas light sources at 527 ECW at Dongen
N79-27344
Two-photon reradiation from laser protective materials
[AD-A068466] N79-27497
RADIATION SOURCES
Measurement of the spectral sensitivity of radiation detectors and detector systems in the vacuumultraviolet spectral range by using a wall stabilized Ar cascade arc according to Boldt as a standard radiator
[MPI-PAE/EXTRATERR-142] N79-27968
Gamma-ray burst observations from Helios-2
[NASA-TM-80284] N79-28115
RADIATION SPECTRA
Measurement of the spectral sensitivity of radiation detectors and detector systems in the vacuumultraviolet spectral range by using a wall stabilized Ar cascade arc according to Boldt as a standard radiator
[MPI-PAE/EXTRATERR-142] N79-27968
RADII
The 10 February 1977 lunar occultation of Uranus. Radius, limb darkening, and polar brightening at 6900 A
[NASA-CR-158780] N79-28074
RADIO ALTIMETERS
Pershing 2 alternate altimeter replacement scheme
[AD-A068168] N79-27483
RADIO ASTRONOMY
Tropospheric limitations on the accuracy of phase measurement of coordinates in astronomy
[NASA-TM-75480] N79-28073
Voyager 1 planetary radio astronomy observations near Jupiter
[NASA-TM-80287] N79-28103
RADIO COMMUNICATION
Feasibility study for a satellite frequency modulated radio communication system
[ESA-CR[P]-1151-VOL-1] N79-27376
Aerospace propagation media modelling and prediction schemes for modern communications, navigation, and surveillance systems
[AGARD-LS-99] N79-27385
Propagation at medium and high frequencies. 1: Practical radio systems and modelling needs
N79-27386
RADIO DIRECTION FINDERS
The error distribution for monopulse direction finding involving several sources
[FFM-267] N79-27123
RADIO EMISSION
Voyager 1 planetary radio astronomy observations near Jupiter
[NASA-TM-80287] N79-28103
RADIO FREQUENCY INTERFERENCE
Discrete Address Beacon System [DABS] Air Traffic Control Radar Beacon System [ATCRBS] interference analysis
[AD-A068565] N79-27119
Correlation of narrow band receiver signals with reflection interference of the incident wave field
[REPT-6-78] N79-27371
RADIO OBSERVATION
Radio observations of asteroids: Results and prospects
[NASA-CR-158781] N79-28075
High energy X-ray and radio studies of Scorpius X-1
[NASA-TM-80298] N79-28077
RADIO TELESCOPES
Synoptic radio maps of the sun at 3.3mm, 1970-1973
[UAG-66] N79-28106
RADIO TRANSMISSION
Transionospheric radio propagation
N79-27387
RADIO TRANSMITTERS
Terrain and ionospheric effects on ELT transmissions to a SARSAT spacecraft
[CRC-1324] N79-27354
RADIO WAVES
Propagation of long radio waves in the earth's environment
N79-27393
RADIOACTIVE CONTAMINANTS
Particulate radioactivity, mainly from nuclear explosions, in air and precipitation in Sweden, mid-year 1975 to mid-year 1977
[FOA-C-40089-T2[A1]] N79-27970
RADIOACTIVE WASTES
Space augmentation of military high-level waste disposal
[NASA-CR-158771] N79-27193
Viscosity and electrical conductivity of glass melts as a function of waste composition
[DP-MS-78-80] N79-27314
DOE program for improvement practices for shallow burial of radioactive waste
[CONF-781109-25] N79-27958
Geohydrologic investigations of buried metamorphic rock and mudstone for the storage of radioactive waste
[DP-MS-79-13] N79-27961
Probabilistic safety analysis for solidified high-level nuclear waste management systems
[NUREG-CR-0577] N79-27962
Radioactive wastes at the Hanford Reservation: A technical review
[COO-2708T004-1] N79-27963
Waste management
[DPST-78-125-2] N79-27964
Development of glass compositions for immobilization of SRP waste
[DP-1517] N79-27965
Technical support for GEIS: Radioactive waste isolation in geologic formations. Volume 20: Thermomechanical stress analysis and development of thermal loading guidelines
[Y/OWI/TM-36/20] N79-27967
RADIOMETERS
Radiometric resolution for monitoring vegetation: How many bits are needed?
[NASA-TM-80293] N79-27637
RADIOSONDES
Engineering flight tests of range meteorological sounding system radiosonde
[AD-A067430] N79-27200
Preliminary assessment of temperature induced radiosonde humidity errors and effects on apparent low-level refractive structures, block program WF 52-55-091
[AD-A068670] N79-27784
Optimum interpolation of radiosonde and satellite-derived temperature fields
[PB-293017/0] N79-27798
RADOME MATERIALS
Exploratory development of resonant metal radomes
[AD-A067547] N79-27357
RADOMES
Foam-filled fiberglass radomes
[AD-A068672] N79-27249
Exploratory development of resonant metal radomes
[AD-A067547] N79-27357
RAIN
Calculation of the attenuation as a function of rainfall intensity for several polarizations
[FUB-43-1977] N79-27382
Diurnal rainfall variability in northeast Brazil
[INPE-1487-RPE/033] N79-27774
RAIN GAGES
Measurements of rainfall intensity: Instrumentation and data processing
[FOA-C-30157-E2,E1] N79-27794
RAINDROPS
Computation of attenuation and phase shift per unit length due to spherical rain drops
[FUB-24-1977] N79-27375
RAM
Electrical characterization of 16K dynamic rams
[AD-A067713] N79-27867
RAMAN SPECTROSCOPY
CARS investigations in sooting and turbulent flames
[AD-A069169] N79-27468
RAMJET ENGINES
The application of ram-type engines to long-range surpersonic missiles
N79-27215
Enthalpy of combustion of RJ-6
[AD-A067968] N79-28037
RANDOM NOISE
Computation of the irregularity factor N sub 0/N sub 1 of a stationary Gaussian process with dual peak power spectral density
[LBF-TB-137] N79-27919
RANDOM NUMBERS
A secretary problem with a random number of choices
[AD-A068186] N79-27902
RANDOM VARIABLES
On optimal discriminants between two classes of random variables in terms of the moments of their distributions
[AD-A068551] N79-27904
RANKINE CYCLE
Diesel organic rankine cycle compound engine [Bottoming Cycle] program plan
[DOE/CS-0052] N79-27521
RARE GASES
Formation of dimers in rare gas beams from nozzles
[MPIS-5/1978] N79-27950
Total scattering cross sections for He[2(1)S, 2(3)S] on He, Ne, Ar, Kr in the thermal energy region
[MPIS-7/1978] N79-27951
Experimental and theoretical studies of integral excitation cross sections associated with alkali-rare gas collisions
[MPIS-3/1978] N79-28005
Theory of hole transport in rare gas solids
N79-28022
RATES [PER TIME]
Thermonuclear reaction rates in a deuterium-tritium plasma
[FOA-C-20283-A2] N79-28044
RATIONAL FUNCTIONS
On rational approximations of groups of operators
[CTH-MATH-1978-10-1] N79-27911
RAY TRACING
Ray calculations of ocean sound channels using a pocket programmable calculator and extended forms of the Hirsch-Carter mathematical model with tables of the incomplete beta function
[AD-A069168] N79-27936
REACTION KINETICS
Thermal rate constants, energy dependence and isotope effect for laser initiated halogen-hydrogenhalide reactions
N79-27253
New instrumental, mathematical, and chemical developments for kinetic methods of analysis
N79-27267
Measurement of the rate constant for the NO+HO2 yields OH+NO2 reaction using laser magnetic resonance
[MPIS-8/1978] N79-27285
Kinetics of coal liquefaction to preasphaltenes, asphaltenes and oils
N79-27320
Mixing and kinetic processes in pulverized coal combustors
[EPRI-FP-806-SY] N79-27330
An algebraic expression for first-order reaction in laminar flow
N79-27470
Kinetics of silica deposition from simulated geothermal brines
[CONF-790108-1] N79-27691
Dynamics of molecular photodissociation --- polyhalide molecules
N79-27940
Kinetic models for irreversible processes on a lattice
N79-28011
REACTION TIME
The effect of acceleration and seat back angle on performance of a reaction time task
[FPRC-1364] N79-27857
REACTIVITY
Immunological reactivity of rats flown aboard Cosmos-605 and Cosmos-690 biosatellites
N79-27824
REACTOR MATERIALS
Cryogenic laser fusion target materials
[LA-UR-79-101] N79-28002

REACTOR PHYSICS
ELMO Bumpy Torus. Alternate concepts development program
[CONF-7810127-1] N79-27999
REACTOR SAFETY
Software coding for reliable data communication in a reactor safety system
[OUEL-1264/78] N79-27379
Physics of reactor safety
[PB-293662/3] N79-27971
REAL TIME OPERATION
Preliminary trend monitoring system data manager's guide
[NASA-CR-160251] N79-27232
Alternative, semi-automated method for performing multiobjective analyses
[BNL-50892] N79-27921
Study of real-time converter of an incoherent image into a transparency: Optical to optical converter/technology study
[ESA-CR[P]-1155] N79-27988
REFERENCE SYSTEMS
Impacts of new energy technologies as measured against reference energy systems --- conferences
[BNL-25475] N79-27694
REFINING
Status report the SRC-1 and SRC-2 processes N79-27616
REFLECTANCE
Image quality of a Wolter-1 type X-ray telescope under particular contrast reduction conditions due to diffuse reflection
[MPI-PAE/EXTRATERR-145] N79-27984
REFLECTORS
Study of membrane reflector technology
[NASA-CR-158729] N79-27655
REGIONAL PLANNING
Application of the unit regional value concept to a study of the mineral resources of Australia N79-27624
Locational response to regulatory policy: A regional analysis of energy facility location --- conferences
[BNL-23597] N79-27695
REGIONS
Response characteristics of Knollenberg light-scattering aerosol counters
[AD-A067701] N79-27750
REGRESSION ANALYSIS
Investigation of a multiple time series model
[AD-A067770] N79-27900
Multiple time series modeling 2
[AD-A067644] N79-27901
REGULATIONS
Findings and views concerning the exemption of kerojet fuels from the mandatory petroleum allocation and price regulations
[DOE/ERA-0023] N79-28058
REINFORCED PLASTICS
Design, manufacturing, and testing of spacecraft thrust cone made of Carbon Fiber Reinforced Plastic (CFRP)
[EMSB-79/78] N79-27240
REINFORCING FIBERS
Foam-filled fiberglass radomes
[AD-A068672] N79-27249
RELATIVISTIC VELOCITY
Gravitational radiation and the ultimate speed in Rosen's Bimetric theory of gravity
[NASA-CR-158718] N79-27743
RELEASING
New sets of diffusion parameters resulting from tracer experiments in 50 and 100 metres release height N79-27564
RELIABILITY
RAM projections for aircraft rotor blades
[AD-A068822] N79-27130
RELIABILITY ANALYSIS
Reliability of steam turbine rotors
[EPRI-NP-923-SY] N79-27519
Steam turbine rotor reliability: Task details
[EPRI-NP-923] N79-27520
REMOTE SENSORS
Remote sensoring of the southeast region of the state of Sao Paulo: A proposition of a methodology for the geological interpretation of SLAR images
[INPE-1461-NTE/148] N79-27356
Egypt as seen by LANDSAT N79-27626
Evaluation of registration, compression and classification algorithms. Volume 1: Results
[NASA-TM-78227-VOL-1] N79-27630
Theory of spectral radiance of pollutants at sea, volume 1
[NASA-CR-158791] N79-27633
Satellite passive remote sensing of off-shore pollutants, volume 2
[NASA-CR-158792] N79-27634
Directional spectra of ocean waves from microwave backscatter: A physical optics solution with application to the short-pulse and two-frequency measurement techniques
[NASA-TM-80295] N79-27636
Radiometric resolution for monitoring vegetation: How many bits are needed?
[NASA-TM-80293] N79-27637
Remote sensing of leaf water content in the near infrared
[NASA-TM-80291] N79-27639
Determination of homogeneous zones by remote sensors
[INPE-1470-RPE/021] N79-27641
Amoco Cadiz: Preliminary observations of the oil spill impact on the marine environment --- conference proceedings, Brest, 7 Jun. 1978
[CNEXO-6-1978] N79-27726
Numerical simulation of VTPR temperature retrievals in a severe storm environment
[NASA-CR-158761] N79-27770
Analysis and preliminary design of optical sensors for propulsion control --- temperature sensors
[NASA-CR-159519] N79-27975
Mars section of remote sensing of basalts in the solar system. Chapter 2 of basaltic volcanism in the solar system
[RSL-221] N79-28097
REMOVAL
Colloid and other forces in particle adhesion and particle removal: A review N79-27318
RENAL FUNCTION
Effect of acute hypoxia on some parameters of renal excretory function and renal hemodynamics N79-27828
REPRODUCTION [COPYING]
Photo-electro-optical reproduction technology survey
[AD-A067534] N79-27977
REQUIREMENTS
Numerical and software requirements for general nonlinear finite element analysis N79-27527
RESCUE OPERATIONS
Standard operating procedures, water immersion facility, revision B
[NASA-CR-160257] N79-27199
RESEARCH AND DEVELOPMENT
Indian national committee for space research report to COSPAR N79-27194
North Stanley Polymer Demonstration Project
[BETC/RI-78/19] N79-27313
Activities of the Laboratory of Electromagnetic Theory N79-27367
The comparison and coordination of national policies and programs in the energy research and development sector
[EUR-5911] N79-27653
Ionospheric research
[NASA-CR-158762] N79-27744
RESEARCH FACILITIES
Sixty years of aeronautical research, 1917-1977 --- Langley Research Center
[NASA-EP-145] N79-27089
Review of neutrino physics at Brookhaven
[BNL-25378] N79-27948
Astronomical activities in the period October 1, 1976 to September 30, 1977 N79-28084
RESEARCH MANAGEMENT
Topics in mathematical programming. Research in nondifferentiable and discrete optimization
[AD-A067554] N79-27879
Investigating software development approaches
[AD-A068742] N79-27880
RESEARCH PROJECTS
Astronomical activities in the period October 1, 1976 to September 30, 1977 N79-28084
RESERVES
On fossil fuel reserves and resources
[IIASA-RM-78-35] N79-27628
RESERVOIRS
Effect of phosphorus supply on algal biomass in a turbid Missouri Reservoir
[PB-293183/0] N79-27816
RESIDENTIAL AREAS
Comprehensive areal model of residential heating demands
[BNL-24998] N79-27692
RESIDUAL STRESS
The contribution of photoelasticity measurement to the study of turbine parts N79-27152
RESOLUTION
Radiometric resolution for monitoring vegetation: How many bits are needed?
[NASA-TM-80293] N79-27637
RESONANCE
Theoretical aspects of the resonant scattering of light by molecules N79-27943
RESONANT VIBRATION
The analysis of engine vibrations N79-27150
RESONATORS
Search for gravitational waves
[LPS-78-3] N79-27762
RESOURCE ALLOCATION
Findings and views concerning the exemption of aviation gasoline from the mandatory petroleum allocation and price regulations
[DOE/ERA-0024] N79-27336
RESOURCES MANAGEMENT
Supply-demand price coordination in water resources management
[IIASA-RR-78-11] N79-27627
RESPIRATION
Respiration N79-27845
RESPIRATORY RATE
The application of ion convection to the development of an electronic spirometer N79-27477
RESPIRATORY SYSTEM
Pneumotachographic distinctions of external respiration in man in the presence of excess intrapulmonary pressure on ground level and at high altitudes N79-27827
Toxicity of oxygen mixed with helium N79-27829
Respiration N79-27845
REUSABLE LAUNCH VEHICLES
Earth-to-orbit reusable launch vehicles: A comparative assessment
[NASA-CR-157444] N79-27192
RHEOLOGY
Exploration of volcanic geothermal energy resources based on rheological techniques
[DOE/ET/28453-3] N79-27676
RICHARDSON NUMBER
Relation of Richardson number to the curvature of the wind profile
[INPR-1486-RPE/032] N79-27775
RIEMANN MANIFOLD
Hardy classes on Riemann surfaces N79-27923
RING CURRENTS
Central plane of the ring current responsible for geomagnetic disturbance in the South American region
[INPE-1482-RPE/029] N79-27746
RING STRUCTURES
Rotor bust protection: Design guidelines for containment N79-27166
RINGS [MATHEMATICS]
An investigation of K-folo complex cobordism N79-27888
RISK
Probabilistic safety analysis for solidified high-level nuclear waste management systems
[NUREG-CR-0577] N79-27962
ROCKET LAUNCHING
Optimum launch vehicle sizing
[AD-A068575] N79-27220
Flight test of four ESTEC heat pipes as a part of the payload planner for launch on an ARIES rocket
[ESA-CR[P]-1146] N79-27222
ROCKS
Geohydrologic investigations of buried metamorphic rock and mudstone for the storage of radioactive waste
[DP-MS-79-13] N79-27961
ROLLER BEARINGS
Vibration of bearings
[NASA-TT-F-679] N79-27501
Ceramic mainshaft roller bearing performance in a gas turbine engine
[AD-A067904] N79-27516
ROOMS
Room heat storage processes
[BMFT-FB-T-78-14] N79-27711
ROTARY WING AIRCRAFT
Prediction of aeroelastic instabilities in rotorcraft N79-27159
ROTATING DISKS
Calculation of stress concentrations in disc alveoles --- viscoplasticity of turbine disks N79-27157
Small turbines: Experiences with disk ruptures N79-27163
ROTATING FLUIDS
The rotating hydraulics of steady flow in open channels N79-27428
Experimental techniques for analyzing unsteady flow in revolving machinery N79-27433
The functioning of axial compressors without adaptation. The uncoupling boundary and revolving separation N79-27434
ROTATING MATTER
Muon spin rotation [muon SR]
[BNL-25216] N79-27946
ROTATING PLASMAS
A three-dimensional model of co-rotating streams in the solar wind. 2: Hydrodynamic streams
[NASA-TM-80276] N79-28110

ROTATING STALLS
Distortions, rotating stall and mechanical solicitations
N79-27177
Rotating stall in axial flow compressors
N79-27430
Axial compressor stall --- effects on aircraft engines
N79-27435
ROTOR AERODYNAMICS
A flight investigation of basic performance characteristics of a teetering-rotor attack helicopter
(NASA-TM-80112) N79-27097
Rotating stall in axial flow compressors
N79-27430
Axial compressor stall --- effects on aircraft engines
N79-27435
ROTOR BLADES (TURBOMACHINERY)
RAM projections for aircraft rotor blades
(AD-A068822) N79-27130
Performance of two-stage fan having low-aspect-ratio first-stage rotor blading
(NASA-TP-1493) N79-27143
Small turbines: Experiences with disk ruptures
N79-27163
Unsteady rotor blade loading in an axial compressor with steady-state inlet distortions
N79-27176
The unsteady aerodynamics of a cascade in translation
N79-27180
Supersonic unstalled flutter
N79-27181
ROTORS
Engine rotor burst containment/control studies
N79-27162
Rotor bust protection: Design guidelines for containment
N79-27166
Reliability of steam turbine rotors
(EPRI-NP-923-SY) N79-27519
Steam turbine rotor reliability: Task details
(EPRI-NP-923) N79-27520
RULES
Induction of decision rules
(INPE-1492-RPE/036) N79-27920
RUNWAYS
Aircraft and avionic related research required to develop an effective high-speed runway exit system
(NASA-CR-159075) N79-27185
RUPTURING
Small turbines: Experiences with disk ruptures
N79-27163

S

S MATRIX THEORY
Semiclassical theory of electronically nonadiabatic transitions in molecular collision processes
(NASA-CR-158776) N79-27944
S-3 AIRCRAFT
Application of color-coding in airborne tactical displays
(AD-A067558) N79-27137
SAFETY FACTORS
The requirement of damage tolerance. An analysis of damage tolerance requirements with specific reference to MIL-A-83444
(NLR-TR-77005-U) N79-27135
Two-photon reradiation from laser protective materials
(AD-A068466) N79-27497
SAFETY MANAGEMENT
Standard operating procedures, water immersion facility, revision B
(NASA-CR-160257) N79-27199
Lightning protection for traffic control systems
(NASA-CR-158779) N79-27401
Probabilistic safety analysis for solidified high-level nuclear waste management systems
(NUREG-CR-0577) N79-27962
SALINITY
Prelimary results of tests of proprietary chemical additives, seeding, and other approaches for the reduction of scale in hypersaline geothermal systems
(UCID-18051) N79-27669
SALYUT SPACE STATION
Simulation of fluid-electrolyte metabolism as a means of preventing orthostatic instability in the crew of the second expedition aboard the Salyut-4 station
N79-27819
SAMPLING
Sampling and analysis methods for geothermal fluids and gases
(PNL-MA-572-APP) N79-27679
A study of sampling schemes for Fourier transform reconstruction with an error analysis
N79-27892
Consideration of sample return and the exploration strategy for Mars
(NASA-TM-58213) N79-28102
SANDS
A study of the theoretical and practical determination of hydrogeological parameters in glacial outwash sands by surface geoelectrics
N79-27733
SATELLITE ANTENNAS
Feasibility of large orbital antennas
(DFH/DSP-032/78-VOL-2) N79-27377
SATELLITE CONTROL
Developing, testing, and operating Lincoln experimental Satellites 8 and 9 (LES-8/9)
(AD-A069095) N79-27218
SATELLITE DRAG
Very low altitude drag-free satellites
(PB-293271/3) N79-27224
SATELLITE OBSERVATION
Japan national report on space research
N79-27196
Satellite passive remote sensing of off-shore pollutants, volume 2
(NASA-CR-158792) N79-27634
An algorithm for retrieval of ocean surface and atmospheric parameters from the observations of the scanning multichannel microwave radiometer (SMMR)
(NASA-TM-80277) N79-27635
Radiometric resolution for monitoring vegetation: How many bits are needed?
(NASA-TM-80293) N79-27637
Energetic electron fluxes in the earth's outer magnetosphere according to observations from the Prognoz-3 station
(PR-415) N79-27763
SATELLITE POWER TRANSMISSION (TO EARTH)
Powersat: An evaluation
(TUM-LRT-TB-22/2) N79-27707
SATELLITE SOLAR POWER STATIONS
Powersat: An evaluation
(TUM-LRT-TB-22/2) N79-27707
SATELLITE-BORNE INSTRUMENTS
The prototype low-energy telescope system for the international solar COSPIN experiment
(ESA-STR-202) N79-27989
SATELLITE-BORNE RADAR
Directional spectra of ocean waves from microwave backscatter: A physical optics solution with application to the short-pulse and two-frequency measurement techniques
(NASA-TM-80295) N79-27636
SCALE (CORROSION)
Prelimary results of tests of proprietary chemical additives, seeding, and other approaches for the reduction of scale in hypersaline geothermal systems
(UCID-18051) N79-27669
SCALE (RATIO)
Reevaluation of modified Mercalli intensity scale for earthquakes using distance as determinant
(PB-294439/5) N79-27767
SCALE MODELS
Analytical and scale model research aimed at improved hangglider design
N79-27081
The development of methods for predicting and measuring distribution patterns of aerial sprays
(NASA-CR-158787) N79-27092
Investigations of interference effects in a wind tunnel caused by a model support strut on a reflection plane mounted half model
(FFA-TN-AU-1335:2) N79-27109
SCATTERING
Optical communication and detection through optical scattering channels
N79-27390
The scattering of thermal phonons by extended defects in dielectric crystals
N79-28017
SCATTERING CROSS SECTIONS
Semiclassical theory of electronically nonadiabatic transitions in molecular collision processes
(NASA-CR-158776) N79-27944
Total scattering cross sections for He(2(1)S, 2(3)S) on He, Ne, Ar, Kr in the thermal energy region
(MPIS-7/1978) N79-27951
Nuclear structure theory
(COO-2171-182) N79-27959
Experimental and theoretical studies of integral excitation cross sections associated with alkali-rare gas collisions
(MPIS-3/1978) N79-28005
SCHOTTKY DIODES
InP and GaAs surface characterization with variable stoichiometry obtained by molecular spray. Applications to the manufacture of Schottky diodes
(LCR-2270-DK) N79-27414
Optical properties of Si and Ge Schottky barrier photodectectors and light waveguides. Research with reference to optical fiber communication
(VTT-ENT-23) N79-27981
SCIENTIFIC SATELLITES
Very low altitude drag-free satellites
(PB-293271/3) N79-27224
SCORPIUS CONSTELLATION
High energy X-ray and radio studies of Scorpius X-1
(NASA-TM-80298) N79-28077
SCREEN EFFECT
Critical behavior of the n-vector and charged n-vector models from an exact solution to the screening approximation
N79-28016
SEA ROUGHNESS
Wind and wave climate in the Netherlands sector of the North Sea between 53 deg and 54 deg north latitude
(KNMI-WR-78-9) N79-27791
SEALS (STOPPERS)
Some flow characteristics of conventional and tapered high pressure drop simulated seals
(NASA-TM-79192) N79-27460
SEAS
Theory of spectral radiance of pollutants at sea, volume I
(NASA-CR-158791) N79-27633
SEAWEEDS
An ultracentrifugal analysis of polymer size and heat stability of carrageenan
N79-27304
SEDIMENT TRANSPORT
Short term sediment movements and related channel charges: The Piceance Basin, Colorado
N79-27622
SEGMENTS
On the attenuation of sound by three-dimensionally segmented acoustic liners in a rectangular duct
(NASA-TM-80118) N79-27932
SEISMIC WAVES
Seismological recordings of nuclear explosions in 1976 obtained at the Hagfors observatory in Sweden
(FOA-C-20275-11) N79-27764
SEISMOGRAPHS
Seismological bulletin of the seismograph stations in the Netherlands, volume 59, 1971
(KNMI-108-59) N79-27765
A microscopic, submicroscopic, and microseismic analysis of stable crack propagation and the effect of chemical environment on stable crack propagation in synthetic quartz
N79-28009
SEISMOLOGY
Wave propagation in anelastic media with applications to seismology
N79-27734
Seismic stratigraphy and basin development, Nestos Delta area, northeastern Greece
N79-27739
SELECTION
Magnitude estimation as a hearing aid selection procedure
N79-27838
On the least favorable configurations in certain two-stage selection procedures
(AD-A068671) N79-27918
SELENOLOGY
What's new on the moon?
(NASA-EP-131) N79-28096
SELF CONSISTENT FIELDS
A systematic determination of extended atomic orbital basic sets and application to molecular SCF and MCSCF calculations
N79-27941
SEMANTICS
Planning nets: A representation for formalizing analogies and semantic models of procedural skills
(AD-A067907) N79-28050
SEMICONDUCTING FILMS
A study of the conduction mechanisms in thin polymeric films with an application to the passivation of semiconductor components
N79-27399
SEMICONDUCTOR DEVICES
Fifth European Specialist Workshop on Microwave Active Semiconductor Devices
(AD-A067492) N79-27405
Pressure contact use on high-power semiconductor devices free of thermal fatigue
(BMFT-FB-T-78-02) N79-27418
Passivation of high voltage power devices by thermal oxidation
(BMFT-FB-T-78-23) N79-27426
SEMICONDUCTORS (MATERIALS)
Development of hydrogen and hydroxyl contamination in thin silicon dioxide thermal films
(AD-A067963) N79-28027
SENSITIVITY
Study of electrical optical materials having increased photosensitivity
(LCR-77-32/R/G.5) N79-27983
SEPARATED FLOW
High performance N2O4/amine elements blowapart
(NASA-CR-160272) N79-27323
High performance N2O4/amine elements blowapart
(NASA-CR-160273) N79-27324
Flow through a furrowed channel. Part 1: Calculated flow patterns
(OUEL-1273/78) N79-27472
SERUMS
The identification and quantitation of UV absorbing compounds in serum by reversed-phase high performance liquid chromatography
N79-27269

SERVICE LIFE
The requirement of damage tolerance. An analysis of damage tolerance requirements with specific vreference to MIL-A-83444
[NLR-TR-77005-U] N79-27135
Basic research into the long duration behavior of insulating materials in SF6: Insulated transmission lines.
[BMFT-FB-T-78-09] N79-27423
SERVOMECHANISMS
Design considerations for improved fluidic input servovalve performance
[AD-A068977] N79-27517
SET THEORY
Stability of the coincidence set for the Signorini problem
N79-27889
Non-finitely based binary algebras derived from lattices
N79-27891
Efficient feature subset selection with probabilistic distance criteria --- pattern recognition
[NASA-CR-160263] N79-27917
On the Gaussian measure of symmetric convex sets
[CTH-MATH-1978-10-2] N79-27927
SEWAGE TREATMENT
Algal growth kinetics in bioconversion of solar energy
N79-27650
An environmental assessment of sewerage centralization with special reference to New York State
N79-28061
SHALE OIL
Shale oil: Focus group results
[DOE/TIC-10019] N79-27644
SHAPES
Shape of the ocean surface and implications for the Earth's interior
N79-27804
SHIELDING
Engine rotor burst containment/control studies
N79-27162
SHIPS
Technology requirements and readiness for very large vehicles
[NASA-TM-80127] N79-27086
SHOCK TUBES
Interferometric techniques and data evaluation methods for the utias 10 cm x 18 cm hypervelocity shock tube
[AD-A067957] N79-27187
A study of response time of pitot pressure probes designed for rapid response and protection of transducer
[NASA-TM-80091] N79-27462
Coupled interactions of shock-wave structure with laminar boundary layer in ionizing-argon shock-tube flows
[AD-A068869] N79-27467
SHOCK TUNNELS
Extension of running time in the RAE hypersonic shock tunnel
[OUEL-1260/78] N79-27191
SHOCK WAVES
Shock formation from discontinuities in the derivatives of solutions of nonlinear hyperbolic systems
[AD-A059201] N79-27090
Analytical study on the ideal response of normal-mode shock-depoled PZT ferroelectric ceramics with resistive, capacities, and inductive loads
[AD-A068552] N79-27312
Coupled interactions of shock-wave structure with laminar boundary layer in ionizing-argon shock-tube flows
[AD-A068869] N79-27467
SHORELINES
Comparison of model and observed nearshore circulation
[ANL/EES-CP/22] N79-27808
SIDE-LOOKING RADAR
Remote sensoring of the southeast region of the state of Sao Paulo: A proposition of a methodology for the geological interpretation of SLAR images
[INPE-1461-NTE/148] N79-27356
SIGNAL ANALYSIS
Correlation of narrow band receiver signals with reflection interference of the incident wave field
[REPT-6-78] N79-27371
Correlation techniques and optimum signal methods in laser optics radar systems and practical measurement technique possibilities
[ILR-33] N79-27499
SIGNAL DETECTION
Optical treatment of information
[FUB-17-1977] N79-27374
SIGNAL DETECTORS
Search for gravitational waves
[LPS-78-3] N79-27762
SIGNAL DISTORTION
Identification of urban and rural multipath objects by means of a new measuring technique
[FOA-C-30149-E2] N79-27378
SIGNAL ENCODING
Computer modeling of voice signals with adjustable pitch and formant frequencies
[AD-A067556] N79-27360
SIGNAL MEASUREMENT
Identification of urban and rural multipath objects by means of a new measuring technique
[FOA-C-30149-E2] N79-27378
SIGNAL PROCESSING
Maximum entropy spectral analysis in the spatial domain
[AD-A068558] N79-27364
ECCM: Performance of radar signal design
[REPT-5-78] N79-27370
Optical treatment of information
[FUB-17-1977] N79-27374
Electronic components for high speed signal processing in fiber optical communication
[BMFT-FB-T-77-75] N79-27383
SIGNAL REFLECTION
Correlation of narrow band receiver signals with reflection interference of the incident wave field
[REPT-6-78] N79-27371
SIGNAL TO NOISE RATIOS
Optimization of the noise to signal ratio in a single photon counting photomultiplier
[LPS-78-6] N79-27381
SIGNAL TRANSMISSION
Decommutator patchboard verifier
[NASA-CASE-KSC-11065-1] N79-27865
SILENCERS
Acoustic silencers for inlet and exhaust of turbomachinery
N79-27514
SILICATES
Effect of silicate ions on electrode overvoltage
[P/539/77/24] N79-27413
I-Xe dating of silicate and troilite from IAB iron meteorites
N79-28095
SILICON
Effect of thermal annealing in boron implanted, laser annealed silicon
[CONF-781167-5] N79-27250
Evaluation of a self-calibrating silicon bolometer
[AD-A068083] N79-27484
Interface and electron tunneling properties of thin oxides on silicon
N79-28023
SILICON CARBIDES
High temperature properties of sintered alpha silicon carbide
[CONF-7810129-2] N79-27251
SILICON COMPOUNDS
Modules of rupture and oxidation resistance of Si12.55Al0.6O0.72N3.52 sialon
[NASA-TP-1490] N79-27309
SILICON DIOXIDE
Kinetics of silica deposition from simulated geothermal brines
[CONF-790108-1] N79-27691
Development of hydrogen and hydroxyl contamination in thin silicon dioxide thermal films
[AD-A067963] N79-28027
SIMULATION
Kinetics of silica deposition from simulated geothermal brines
[CONF-790108-1] N79-27691
The digital simulation of areal salt transport to evaluate water management proposals in a coastal aquifer
N79-27803
SINGLE CRYSTALS
Catalysis by platinum single crystal surfacesD Low pressure hydrocarbon reactions and the effects of introducing strongly bound oxygen at the surface
N79-28012
The use of molecular sprays in ultrahigh vacuum for GaAs monocrystalline growth applications
[LCR-2251-DK-PT-1] N79-28031
SINTERING
High temperature properties of sintered alpha silicon carbide
[CONF-7810129-2] N79-27251
SITES
Air monitoring network design for power plant siting
N79-27590
Geologic assessment of compressed air storage sites in Kansas
[EPRI-EM-877] N79-27689
SITTING POSITION
Possibilities of preventing adverse reactions in simulating the acute period of adaptation to weightlessness
N79-27825
The effect of a reclined sitting position on psychomotor performance during exposure to high, sustained +Gsub z acceleration
[FPRC-1362] N79-27856
The effect of acceleration and seat back angle on performance of a reaction time task
[FPRC-1364] N79-27857
The influence of seat back angle on acceleration tolerance
702970[FPRC-1365] N79-27858
SIZE DETERMINATION
Optimum launch vehicle sizing
[AD-A068575] N79-27220
SIZE SEPARATION
Acoustical particle sizing device
N79-27715
SKIN FRICTION
Calculation of skin friction in two-dimensional, vtransonic, turbulent flow --- computer programs
[AD-A067423] N79-27102
SKIN TEMPERATURE [NON-BIOLOGICAL]
Behavior of the thermal skin of cooling pond waters vsubjected to moderate wind speeds
[CONF-781213-3] N79-27722
SKYLAB PROGRAM
Handbook on astronaut crew motion disturbances for control system design --- in skylab
[NASA-RP-1025] N79-27237
SLABS
HSLAB: An interactive program for one dimensional heat flow problems
[FOA-C-20288-D6[A3]] N79-27474
SLENDER CONES
Boundary layer transition
N79-27443
SLURRIES
Prospects for coal slurry pipelines in California
N79-27608
SOARING
A study of course deviations during cross-country soaring
N79-27072
Contemporary soaring nomenclature
N79-27085
SOCIAL FACTORS
Determination of homogeneous zones by remote sensors
[INPE-1470-RPE/021] N79-27641
Identification of social and economic difficulties associated with the introduction of solar energy devices
[BMFT-FB-T-78-47] N79-27712
SODIUM COMPOUNDS
Mass spectrometric investigation of the vaporization of sodium and potassium chromates: Preliminary results
[NASA-TM-79210] N79-27279
SOIL EROSION
Short term sediment movements and related channel charges: The Piceance Basin, Colorado
N79-27622
SOIL MECHANICS
Evaluation of three constitutive models for soils
[AD-A068222] N79-27755
SOLAR ACTIVITY
Solar and lunar daily variation at low latitudes during quiet and disturbed days
[INPE-1435-RPE/011] N79-28088
Relationship between sunspot numbers during years of sunspot maximum and sunspot minimum
[INPR-1485-RPE/031] N79-28108
SOLAR ARRAYS
Test of concentrator solar array model for SEPS
[NASA-TM-78230] N79-27662
Study of a flexible solar array generator for a remote sensing satellite. Volume 1: Technical report
[ESS/SS-909-VOL-1] N79-27709
SOLAR ATMOSPHERE
A phase study of a grazing incidence solar telescope. Volume 1: Executive summary
[ESS/SS-814-VOL-1] N79-28082
SOLAR CELLS
High voltage surface-charged environment test vresults from space flight and ground simulation experiments
[NASA-TM-79184] N79-27235
A 10-kilowatt photovoltaic concentrator array
[SAND-78-7024] N79-27699
SOLAR COLLECTORS
Performance prediction evaluation of ceramic materials in point-focusing solar receivers
[NASA-CR-158774] N79-27654
Thermal performance evaluation of the Semco v[liquid] solar collector
[NASA-CR-161230] N79-27656
Indoor test for thermal performance evaluation of seven Elcam fin-tube solar collector configurations
[NASA-CR-161236] N79-27657
Modeling passive solar buildings with hand calculations --- conferences
[LBL-8583] N79-27683
SOLAR COOLING
Solar Heating and Cooling Of Buildings [SHACOB] requirements definition and impact analysis
[EPRI-ER-808-VOL-1] N79-27687
SOLAR CORPUSCULAR RADIATION
The prototype low-energy telescope system for the international solar COSPIN experiment
[ESA-STR-202] N79-27989
A three-dimensional model of co-rotating streams in the solar wind. 2: Hydrodynamic streams
[NASA-TM-80276] N79-28110
Local instabilities of Alfven waves in high speed streams
[LPS-78-2] N79-28111
SOLAR CYCLES
Periodicities in the interplanetary magnetic field polarity
[INPE-1425-RPE/005] N79-28089

SOLAR ELECTRIC PROPULSION
A thermal control approach for a solar electric propulsion thrust subsystem
[NASA-TM-79175] N79-27236
SOLAR ELECTRONS
A theory of local and global processes which affect solar wind electrons. 2: Experimental support
[NASA-TM-79628] N79-28109
SOLAR ENERGY
The effects of regional insolation differences upon advanced solar thermal electric power plant performance and energy costs
[NASA-CR-158768] N79-27660
Mead 25 kilowatt photovoltaic system --- conferences
[COO-4094-19] N79-27677
Electric utilities and solar energy: The service contract in a new social context
[ORAU/IEA(O)-79-3] N79-27685
Production of hot water with the aid of solar energy: Conditions and costs
[SIB-R-83-1978] N79-27700
Citizens' solar program: State reports on barriers and strategies to renewable energy development
[HCP/U6308-01] N79-27703
Identification of social and economic difficulties associated with the introduction of solar energy devices
[BMFT-FB-T-78-47] N79-27712
Review of selected solar market studies and techniques
[SERI/PR-52-076] N79-28056
SOLAR ENERGY CONVERSION
Algal growth kinetics in bioconversion of solar energy N79-27650
Performance prediction evaluation of ceramic materials in point-focusing solar receivers
[NASA-CR-158774] N79-27654
Solar energy system installed at Mount Rushmore National Visitor Center in Keystone, South Dakota
[NASA-CR-161238] N79-27661
Analysis of the potential of wind energy conversion systems
[SAND-78-2099C] N79-27668
Metal hydride solar heat pump and power system [HYCSOS]
[CONF-781133-5] N79-27675
Solar energy for agricultural and industrial process heat
[DOE/CS-0053] N79-27688
Environmental readiness document. Solar: Hot water and passive, commercialization phase 3 planning
[DOE/ERD-0010] N79-27690
Storage systems analysis --- Solar Thermal Power Program
[SERI/PR-35-101] N79-27705
Powersat: An evaluation
[TUM-LRT-TB-22/2] N79-27707
SOLAR GENERATORS
Demands and effects of solar technology on electric power storage
[AED-CONF-78-155-047] N79-27678
Design concept and feasibility study of a flexible deployable, solar panel generator used on a teledetection satellite
[S-1267-CA/81-VOL-1] N79-27708
SOLAR HEATING
Solar Heating and Cooling Of Buildings [SHACOB] requirements definition and impact analysis
[EPRI-ER-808-VOL-1] N79-27687
SOLAR MAGNETIC FIELD
Periodicities in the interplanetary magnetic field polarity
[INPE-1425-RPE/005] N79-28089
SOLAR RADIATION
Solar radiation absorption studies in the atmosphere and ocean using a two stream method
[MITT-25] N79-27620
Solar energy information and data for Illinois
[PB-292712/7] N79-27800
SOLAR RADIO EMISSION
Synoptic radio maps of the sun at 3.3mm, 1970-1973
[UAG-66] N79-28106
SOLAR SPECTRA
Balloon borne ultraviolet spectrometer
[AD-A067688] N79-27482
SOLAR SYSTEM
Reports of planetary geology program, 1978 - 1979
[NASA-TM-80339] N79-28066
SOLAR TOTAL ENERGY SYSTEMS
Some analytic models of passive solar building performance: A theoretical approach to the design of energy-conserving buildings N79-27651
Reliability and maintainability evaluation of freezing in solar systems
[ANL/SDP/TM-78-3] N79-27674
Midtemperature Solar Systems Test Facility test results: Effects of severe hailstorm on 9 August 1978
[SAND-78-2182] N79-27680
Manual for the Solar Total Energy System Evaluation Program
[SAND-78-7045] N79-27682
SOLAR WIND
On the reliability of heavy ion detection in the plasma flow near M
[PR-427] N79-28093
On the possibility of determining the Venus magnetic moment from magnetic measurements in the tail
[PR-432] N79-28105
Kinetic versus hydrodynamic solar wind models
[AERONOMICA-ACTA-A-196-1978] N79-28107
A theory of local and global processes which affect solar wind electrons. 2: Experimental support
[NASA-TM-79628] N79-28109
A three-dimensional model of co-rotating streams in the solar wind. 2: Hydrodynamic streams
[NASA-TM-80276] N79-28110
SOLID PROPELLANT ROCKET ENGINES
Response of a rocket motor to transverse blast loading
[AD-A068464] N79-27239
SOLID PROPELLANTS
The utilization of a national polymer acquired for solid propellants used in space vehicles
[INPE-1473-RPE/024] N79-27325
Modeling of polymer networks for application to solid propellant formulating
[NASA-CR-158788] N79-27326
SOLID STATE
Material science and solid state physics studies with positive muon spin precession --- fe[a1] alloys
[NASA-CR-158786] N79-28025
SOLIDIFIED GASES
Theory of hole transport in rare gas solids N79-28022
SOLIDS
The influence of the forces of interaction between solids on their adhesiveness N79-27317
Acoustic emission sources in brittle solids --- conferences
[LBL-8335] N79-27937
On the use of the photoacoustic effect for investigating phase-transitions in solids
[INPE-1476-RPE/027] N79-28026
SOLUTIONS
Chemical interaction of aqueous solutions with epidote-feldspar mineral assemblages in geologic systems N79-27741
A study of crystal growth by solution technique --- triglycine sulfate single crystals
[NASA-CR-158763] N79-28024
SOLVENT EXTRACTION
Status report the SRC-1 and SRC-2 processes N79-27616
EXXON donor solvent coal liquefaction process N79-27618
SONAR
The Sea-Beam: A multi-beam echo-sounder installed on the oceanographic ship 'Jean Charcot'
[CNEXO-STR-37] N79-27810
SOOT
Soot formation in combustion
[MPIS-22/1978] N79-27288
CARS investigations in sooting and turbulent flames
[AD-A069169] N79-27468
SOUND PROPAGATION
An experimental study of sound radiation from hyperboloidal inlet ducts
[NASA-TM-80109] N79-27931
SOUND TRANSMISSION
A numerical model of acoustic fluctuations for single- and paired-path transmissions in real and canonical oceans N79-27801
SOUND WAVES
A review on fundamentals of acoustic wave theory and noise generation N79-27510
SOUNDING
Engineering flight tests of range meteorological sounding system radiosonde
[AD-A067430] N79-27200
Electromagnetic induction in a conducting plate with a charged vertical finite cylinder
[GAMMA-30] N79-27757
SOUTH AMERICA
Central plane of the ring current responsible for geomagnetic disturbance in the South American region
[INPE-1482-RPE/029] N79-27746
SOUTH DAKOTA
Solar energy system installed at Mount Rushmore National Visitor Center in Keystone, South Dakota
[NASA-CR-161238] N79-27661
SOUTHERN CALIFORNIA
Time-dependent gravity in southern California, May 1974 - Apr 1979
[NASA-CR-158765] N79-27807
SOUTHERN HEMISPHERE
Influence of northern and southern hemisphere sq current systems on the equatorial region
[INPE-1434-RPE/010] N79-27747
SPACE ENVIRONMENT SIMULATION
Effects of space environment on composites: An analytical study of critical experimental parameters
[NASA-CR-158767] N79-27244
SPACE ERECTABLE STRUCTURES
Erectable space platform for space sciences and applications
[NASA-CR-159091] N79-27217
SPACE EXPLORATION
Consideration of sample return and the exploration strategy for Mars
[NASA-TM-58213] N79-28102
SPACE FLIGHT
Space biology and aerospace medicine, v. 13, no. 3, 1979
[JPRS-73784] N79-27817
The combined effect of space flight factors and radiation on rat skeletal muscles N79-27821
Catecholamines and enzymes of metabolism thereof in the rat hypothalamus after flight aboard Cosmos-782 biosatellite N79-27822
Tissular metabolism in mixed type fibers of rat skeletal muscles after flight aboard Cosmos-690 biosatellite N79-27823
Immunological reactivity of rats flown aboard Cosmos-605 and Cosmos-690 biosatellites N79-27824
Possibilities of preventing adverse reactions in simulating the acute period of adaptation to weightlessness N79-27825
Morphological distinctions of the rat thyroid and parathyroid following long-term space flights N79-27835
SPACE HEATING [BUILDINGS]
Metal hydride solar heat pump and power system [HYCSOS]
[CONF-781133-5] N79-27675
SPACE MISSIONS
Japan national report on space research N79-27196
Voyager 2 Jupiter encounter
[NASA-NEWS-RELEASE-79-86] N79-28094
SPACE PROGRAMS
Canada report to COSPAR --- conferences N79-27195
Space activity in Austria, 1976/77 N79-28060
SPACE SHUTTLES
Erectable space platform for space sciences and applications
[NASA-CR-159091] N79-27217
Preliminary trend monitoring system data manager's guide
[NASA-CR-160251] N79-27232
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160271] N79-27349
ORRC/SAIL interface control document for SAIL OFT data tapes, revision A
[NASA-TM-80479] N79-27873
SPACE SUITS
Probability of caisson disease while wearing a space vsuit when exiting from a spacecraft with an atmosphere close to that of earth N79-27826
SPACE TRANSPORTATION SYSTEM
Earth-to-orbit reusable launch vehicles: A comparative assessment
[NASA-CR-157444] N79-27192
Space augmentation of military high-level waste disposal
[NASA-CR-158771] N79-27193
Preliminary trend monitoring system data manager's guide
[NASA-CR-160251] N79-27232
SPACE-TIME FUNCTIONS
Space and time solution for two coupled intensity deviations from a stationary nonlinear state N79-28004
SPACEBORNE TELESCOPES
A phase study of a grazing incidence solar telescope. Volume 1: Executive summary
[ESS/SS-814-VOL-1] N79-28082
GRIST: A study of a grazing incidence solar telescope. Volume 2: Technical report
[ESS/SS-814-VOL-2] N79-28083
SPACECRAFT ANTENNAS
The apparent noise temperature of the earth as seen by a SARSAT spacecraft receiving antenna
[CRC-1323] N79-27355
SPACECRAFT CHARGING
Extension, validation and application of the NASCAP code
[NASA-CR-159595] N79-27397
NASCAP user's manual, 1978
[NASA-CR-159417] N79-27398
SPACECRAFT COMMUNICATION
Developing, testing, and operating Lincoln experimental Satellites 8 and 9 [LES-8/9]
[AD-A069095] N79-27218

Terrain and ionospheric effects on ELT transmissions to a SARSAT spacecraft
[CRC-1324] N79-27354
The apparent noise temperature of the earth as seen by a SARSAT spacecraft receiving antenna
[CRC-1323] N79-27355
SPACECRAFT COMPONENTS
Heat pipe qualification requirements --- spacecraft components
[ESA-PSS-49/TST-01-ESTEC] N79-27471
SPACECRAFT CONFIGURATIONS
Technology requirements and readiness for very large vehicles
[NASA-TM-80127] N79-27086
SPACECRAFT DESIGN
Spacelab follow-on development: Executive summary. Heat rejection augmentation and increased capability for the Spacelab liquid loops
[RP-AI-0239] N79-27238
Study of a flexible solar array generator for a remote sensing satellite. Volume 1: Technical report
[ESS/SS-909-VOL-1] N79-27709
SPACECRAFT ENVIRONMENTS
Space biology and aerospace medicine, v. 13, no. 3, 1979
[JPRS-73784] N79-27817
The combined effect of space flight factors and radiation on rat skeletal muscles
N79-27821
Catecholamines and enzymes of metabolism thereof in the rat hypothalamus after flight aboard Cosmos-782 biosatellite
N79-27822
Tissular metabolism in mixed type fibers of rat skeletal muscles after flight aboard Cosmos-690 biosatellite
N79-27823
Immunological reactivity of rats flown aboard Cosmos-605 and Cosmos-690 biosatellites
N79-27824
SPACECRAFT LAUNCHING
Japan national report on space research
N79-27196
SPACECRAFT POWER SUPPLIES
Design concept and feasibility study of a flexible deployable, solar panel generator used on a teledetection satellite
[S-1267-CA/81-VOL-1] N79-27708
SPACECRAFT PROPULSION
A thermal control approach for a solar electric propulsion thrust subsystem
[NASA-TM-79175] N79-27236
SPACECRAFT TRAJECTORIES
Unmodeled perturbation effect on the orbit determination accuracy
[PR-433] N79-27197
Very low altitude drag-free satellites
[PB-293271/3] N79-27224
SPACELAB
Spacelab follow-on development: Executive summary. Heat rejection augmentation and increased capability for the Spacelab liquid loops
[RP-AI-0239] N79-27238
A phase study of a grazing incidence solar telescope. Volume 1: Executive summary
[ESS/SS-814-VOL-1] N79-28082
GRIST: A study of a grazing incidence solar telescope. Volume 2: Technical report
[ESS/SS-814-VOL-2] N79-28083
SPATIAL FILTERING
Maximum entropy spectral analysis in the spatial domain
[AD-A068558] N79-27364
Study of a method for filtering optical images
[BNWL-TR-343] N79-27979
SPECIFIC HEAT
Relationship of PVT conditions and specific heat capacity of oils for thermodynamic measurements
[NEL-658] N79-28043
SPECIFICATIONS
Heat pipe qualification requirements --- spacecraft components
[ESA-PSS-49/TST-01-ESTEC] N79-27471
SFS: A file system supporting Pascal files. Design and specification
[NPL-DNACS-88] N79-28053
SPECTRA
New developments for vidicon-based uv-visible spectrometers
N79-27476
A comparison of simulated and experimental wave spectra in the nearshore region
[NASA-TM-80478] N79-27806
SPECTRAL EMISSION
Extreme ultraviolet diagnosis of a neutral-beam-heated mirror machine
N79-27994
SPECTRAL ENERGY DISTRIBUTION
High pressure arcs in SF6. Part 2: Energy transport by radiation
[BMFT-FB-T-78-04-PT-2] N79-27420
Computation of the irregularity factor N sub 0/N sub 1 of a stationary Gaussian process with dual peak power spectral density
[LBF-TB-137] N79-27919
Photometry of a complete sample of faint galaxies
N79-28071
SPECTRAL RESOLUTION
Construction and setting up of a lamellar grating with a very wide spectral range and its use as a Fourier spectrometer for astrophysical measurements on large molecules
[MPI-PAE/EXTRATERR-144] N79-27949
SPECTRAL THEORY
Nuclear structure theory
[COO-2171-182] N79-27959
SPECTROMETERS
Computer controlled ESR
[AD-A068164] N79-27868
SPECTROSCOPIC ANALYSIS
Dynamics of molecular photodissociation --- polyhalide molecules
N79-27940
Hydrogen in germanium
[LBL-7996] N79-28030
SPECTRUM ANALYSIS
Laboratory analogues to cosmic dust
N79-27275
Maximum entropy spectral analysis in the spatial domain
[AD-A068558] N79-27364
Relationship of red and photographic infrared spectral radiances to alfalfa biomass, forage water content, percentage canopy cover, and severity of drought stress
[NASA-TM-80272] N79-27638
An investigation of K-folo complex cobordism
N79-27888
Multiple time series modeling 2
[AD-A067644] N79-27901
Spectral analysis using the Karhunen-Loeve transform
[REPT-7-78] N79-27922
The hadron spectrum at ground level, part 1. The stability of the period of cygnus x-3, part 2
N79-28072
SPECULAR REFLECTION
Acoustical speckle interferometry
[AD-A067664] N79-27935
SPEECH
A new hardware approach to coefficient determination for the linear prediction of speech
N79-27863
SPEECH RECOGNITION
Estimation of the parameters of an autoregressive process in the presence of additive white noise
[AD-A068749] N79-27363
SPHERICAL HARMONICS
Estimation of the geopotential coefficients
[INPE-1427-RPE/006] N79-27749
Spherical harmonic models of the geomagnetic field
[BULL-8] N79-27761
Transformations of spherical harmonics and applications to geodesy and satellite
[INPE-1453-RPE/018] N79-27895
SPINEL
A study of impurity and radiation induced point defects in MgAl2O4 [spinel]
N79-28015
SPIROMETERS
The application of ion convection to the development of an electronic spirometer
N79-27477
SPOILERS
Spoiler controls
N79-27207
SPRAYING
The development of methods for predicting and measuring distribution patterns of aerial sprays
[NASA-CR-158787] N79-27092
SQUID [DETECTORS]
Development of a low drift SQUID magnetometer for geophysical applications
[GAMMA-32] N79-27759
STABILITY
Stability sensitivity of the climatological dispersion model: A practical examination --- using emission data from an industrial plant
N79-27588
Vertical changes in stability conditions within the first 100 meters: Tennessee Valley
N79-27596
STAINLESS STEELS
Ultrasonic pattern recognition study of intergranular stress corrosion cracks vs weld crown reflectors in SS piping
[EPRI-NP-891] N79-27297
Elevated temperature ductility of types 304 and 316 stainless steel
[CONF-781202-38] N79-27298
STANDARDS
A consideration of measures and standards of performance of air quality simulation models
N79-27589
STAR CLUSTERS
A study of the molecular complexes accompanying MON OB1 MON OB2 and CMA OB1
N79-28068
A search for X-ray emission from rich clusters, extended halos around clusters, and superclusters
[NASA-TM-80294] N79-28092
STARS
Catalogue of 'strict 0.01 mag photometric star boxes'
[PUBL-SER-B-FASC-2] N79-28081
STATISTICAL ANALYSIS
MK 82 bomb ejection sensitivity test report
[AD-A068583] N79-27132
Unmodeled perturbation effect on the orbit determination accuracy
[PR-433] N79-27197
Planning, execution and statistical evaluation of hit simulations
N79-27214
Analysis of 1st and 2nd moments of the concentration distribution for near ground releases of tracers in the atmosphere
N79-27559
The design of air quality networks
N79-27580
Characterizations of the exponential distributions by relevation type equations
[AD-A067542] N79-27898
STATISTICAL DISTRIBUTIONS
The error distribution for monopulse direction finding involving several sources
[FFM-267] N79-27123
STATISTICAL MECHANICS
Nonlinear models in Hamiltonian dynamics and statistical mechanics
N79-28034
STATISTICAL WEATHER FORECASTING
The catalogue of objective statistical weather forecasts for the northern Alps, the Valais, and northern and central Grisons
[SZ-ISSN-0080-7346] N79-27771
STEADY FLOW
The rotating hydraulics of steady flow in open channels
N79-27428
STEADY STATE
Unsteady rotor blade loading in an axial compressor with steady-state inlet distortions
N79-27176
STEAM TURBINES
Reliability of steam turbine rotors
[EPRI-NP-923-SY] N79-27519
STEERABLE ANTENNAS
Computer controlled near field measurements for testing steerable array antennas
[FFM-263] N79-27372
STELLAR EVOLUTION
On the origin of the elements: A brief review
[INPE-1466-RPE/019] N79-28087
STELLAR MASS
Rapid photometry of cataclysmic variable stars
N79-28069
STEP FUNCTIONS
Stability of variable-step methods for ordinary differential equations
[COO-2383-0048] N79-27907
A simple method to increase the robustness of t-type interval estimators in some practical situations
N79-27915
STIRLING CYCLE
Stirling Engines
[VKI-LECTURE-SERIES-53] N79-27502
Stirling engines
N79-27503
Advanced theory of the Stirling cycle digital simulation of regenerative engine operation
N79-27504
Prospects for heavy/medium duty automotive stirling engines
N79-27505
Development of a low cost heavy/medium duty automotive Stirling engine
N79-27506
Degrees of freedom in the layout of Stirling engines
N79-27507
Unique requirements for the cooperation of computation and design in the development of Stirling engines
N79-27508
Energy-state formulation of lumped volume dynamic equations with application to a simplified free piston Stirling engine
[NASA-TM-79197] N79-27663
STOCHASTIC PROCESSES
Spectral analysis using the Karhunen-Loeve transform
[REPT-7-78] N79-27922
Mossbauer study of Y[Fe(0.022)Co(0.978)2] from 259K to 0.18K using a stochastic model of magnetic ordering
N79-28014
STOICHIOMETRY
InP and GaAs surface characterization with variable stoichiometry obtained by molecular spray. Applications to the manufacture of Schottky diodes
[LCR-2270-DK] N79-27414
STORM DAMAGE
Midtemperature Solar Systems Test Facility test results: Effects of severe hailstorm on 9 August 1978
[SAND-78-2182] N79-27680

STORMS [METEOROLOGY]
Numerical simulation of VTPR temperature retrievals in a severe storm environment
[NASA-CR-158761] N79-27770
STRAIN RATE
Investigation on the effect the strain ratio has on sheet metal formability
N79-27291
Displacement and strain measurement using focused image holography
N79-27528
STRATIGRAPHY
The Saltville thrust decollement: Deformation of Maccrady formation evaporites
N79-27738
Seismic stratigraphy and basin development, Nestos Delta area, northeastern Greece
N79-27739
Technical support for GEIS: Radioactive waste isolation in geologic formations. Volume 20: Thermomechanical stress analysis and development of thermal loading guidelines
[Y/OWI/TM-36/20] N79-27967
STRATOSPHERE
A summary of research on the NASA-Global Atmospheric Sampling Program performed by the Atmospheric Sciences Research Center --- ozone transport theory
[NASA-CR-159614] N79-27716
STRESS [PHYSIOLOGY]
Effects of vibration on the human organism
N79-27862
STRESS ANALYSIS
Stresses, vibrations, structural integration and engine integrity [including aeroelasticity and flutter]
[AGARD-CP-248] N79-27148
Aircraft engine design using experimental stress analysis techniques
N79-27151
Stress interpretation in the finite element method
N79-27155
Some theoretical and experimental investigations of stresses and vibrations in a radial flow rotor
N79-27158
Boundary-integral equation analysis of an advanced turbine disk rim slot
N79-27161
Experimental and analytical study of fatigue damage in notched graphite/epoxy laminates
[NASA-TM-80121] N79-27245
Steam turbine rotor reliability: Task details
[EPRI-NP-923] N79-27520
The buckling of short tubes under external pressure
[OUEL-1258/78] N79-27542
Technical support for GEIS: Radioactive waste isolation in geologic formations. Volume 20: Thermomechanical stress analysis and development of thermal loading guidelines
[Y/OWI/TM-36/20] N79-27967
STRESS CONCENTRATION
The contribution of photoelasticity measurement to the study of turbine parts
N79-27152
Calculation of stress concentrations in disc alveoles --- viscoplasticity of turbine disks
N79-27157
The directional stability of crack propagation
N79-27530
Stress-intensity factors for internal surface cracks in cylindrical pressure vessels
[NASA-TM-80073] N79-27532
Effects of geometric variables on stress intensity factors for crack gages
[AD-A068631] N79-27533
Bolted Joint Fatigue Programme. Volume 1: Stage 1, sections 1 to 6
[S/T-MEMO-1/77-VOL-1] N79-27536
Bolted Joint Fatigue Programme. Volume 2: Stage 1, appendices A, B, and C
[S/T-MEMO-1/77-VOL-2] N79-27537
Bolted Joint Fatigue Programme. Volume 3: Stage 2, supplementary investigations 1 to 6
[S/T-MEMO-1/77-VOL-3] N79-27538
Bolted Joint Fatigue programme. Volume 4: Stage 2, supplementary investigations 7 to 9
[S/T-MEMO-1/77-VOL-4] N79-27539
STRESS CORROSION CRACKING
Ultrasonic pattern recognition study of intergranular stress corrosion cracks vs weld crown reflectors in SS piping
[EPRI-NP-891] N79-27297
STRESS CYCLES
Collected practical data on fatigue life research. On the interpretation of fatigue tests under combined constraints
[CETIM-1-1D-01-0] N79-27540
STRESS MEASUREMENT
Correlation of predicted and measured thermal stresses on an advanced aircraft structure with dissimilar materials --- hypersonic heating simulation
[NASA-TM-72865] N79-27088
STRESS TENSORS
A numerical fluid dynamics calculation method for all flow speeds
N79-27454
STRESS-STRAIN RELATIONSHIPS
Cyclic stress-strain behavior of ERNiCr-3 weld filler metal
[CONF-781202-31] N79-27535
STRUCTURAL ANALYSIS
Stresses, vibrations, structural integration and engine integrity [including aeroelasticity and flutter]
[AGARD-CP-248] N79-27148
Structural analysis of a gas turbine impeller using finite-element and holographic techniques
N79-27149
Numerical and software requirements for general nonlinear finite element analysis
N79-27527
STRUCTURAL BASINS
Short term sediment movements and related channel charges: The Piceance Basin, Colorado
N79-27622
Seismic stratigraphy and basin development, Nestos Delta area, northeastern Greece
N79-27739
STRUCTURAL DESIGN
A new facility for structural engine testing
N79-27173
Analysis, design, and test of acoustic treatment in a laboratory inlet duct
[NASA-CR-3161] N79-27934
STRUCTURAL PROPERTIES [GEOLOGY]
The Saltville thrust decollement: Deformation of Maccrady formation evaporites
N79-27738
Thickness of western mare basalts
[NASA-CR-158784] N79-28101
STRUTS
Investigations of interference effects in a wind tunnel caused by a model support strut on a reflection plane mounted half model
[FFA-TN-AU-1335:2] N79-27109
SUBSONIC FLOW
Calculation of pressure distribution for a wing-body combination at subsonic Mach numbers
[FFA-TN-AU-1091] N79-27110
SUBSONIC SPEED
Engine performance considerations for the large subsonic transport
N79-27139
SULFATES
Regional transport and photochemical model of atmospheric sulfates
N79-27575
The European regional model of air pollution [EURMAP] and its application to short term episodes
N79-27576
A climatology of meteorological parameters for short-range dispersion and long-range transport
N79-27577
A multi-scale dispersion model for local and regional sulfur dioxide/sulfate concentrations: Formulation and initial evaluation
N79-27578
Compilation and analysis of data sets for the evaluation of regional sulfate models
N79-27579
A study of crystal growth by solution technique --- triglycine sulfate single crystals
[NASA-CR-158763] N79-28024
SULFUR DIOXIDES
A method of computing maximum ground-level concentrations of SO2 under prolonged stagnation conditions
N79-27546
Validation of the SO2 emission inventory for the Milan district area [50 X 60 km]
N79-27595
Fluidized combustion of coal --- to limit SO2 and NOx emissions
N79-27613
SULFUR FLUORIDES
High pressure arcs in SF6. Part 1: Formation and velocity distribution of vapor jets at the electrodes
[BMFT-FB-T-78-03-PT-1] N79-27419
High pressure arcs in SF6. Part 2: Energy transport by radiation
[BMFT-FB-T-78-04-PT-2] N79-27420
High pressure arcs in SF6. Part 3: Influence of magnetic fields on circuit breaker arcs
[BMFT-FB-T-78-05-PT-3] N79-27421
High pressure arcs in SF6. Part 4: Field strength measurements in blown SF6-arcs
[BMT-FB-T-78-06-PT-4] N79-27422
Basic research into the long duration behavior of insulating materials in SF6: Insulated transmission lines.
[BMFT-FB-T-78-09] N79-27423
SULFUR OXIDES
Evaluation of the flash desulfurization process for coal cleaning
[PB-292328/2] N79-27342
A plume dispersion study at Mildred Lake, Alberta
N79-27581
SUNLIGHT
Solar energy information and data for Illinois
[PB-292712/7] N79-27800
SUNSPOTS
Relationship between sunspot numbers during years of sunspot maximum and sunspot minimum
[INPR-1485-RPE/031] N79-28108
SUPERCONDUCTIVITY
Development of a low drift SQUID magnetometer for geophysical applications
[GAMMA-32] N79-27759
SUPERCOOLING
Onset of condensation effects as detected by total pressure probes in the Langley 0.3-meter transonic cryogenic tunnel
[NASA-TM-80072] N79-27094
SUPERSATURATION
A study of crystal growth by solution technique --- triglycine sulfate single crystals
[NASA-CR-158763] N79-28024
SUPERSONIC BOUNDARY LAYERS
Lee side flow field over slender delta wings of finite thickness
[ILR-23] N79-27103
SUPERSONIC FLIGHT
The application of ram-type engines to long-range surpersonic missiles
N79-27215
SUPERSONIC FLOW
Aeropropulsion systems test facility rake calibration test in tunnel A
[AD-A068975] N79-27189
SUPERSONIC FLUTTER
The effect of intake conditions on supersonic flutter in turbofan engines
N79-27175
The unsteady aerodynamics of a cascade in translation
N79-27180
Supersonic unstalled flutter
N79-27181
SUPINE POSITION
The effect of a reclined sitting position on psychomotor performance during exposure to high, sustained +Gsub z acceleration
[FPRC-1362] N79-27856
The effect of acceleration and seat back angle on performance of a reaction time task
[FPRC-1364] N79-27857
The influence of seat back angle on acceleration tolerance
[FPRC-1365] N79-27858
SUPPLYING
The 1980 motor gasoline supply and demand. Analysis memorandum AM/ES/79-12
[DOE/EIA-0102/32] N79-27337
Energy supply and demand in California
N79-27603
Coal supply for California
N79-27607
Supply-demand price coordination in water resources management
[IIASA-RR-78-11] N79-27627
SUPPORT SYSTEMS
Correcting memory of microcontrol system aided by a computer
[INPE-1489-TDL/009] N79-27874
SURFACE LAYERS
Experiments with a Markov chain dispersion model applied to vertical dispersion in the surface layer
N79-27569
Behavior of the thermal skin of cooling pond waters subjected to moderate wind speeds
[CONF-781213-3] N79-27722
SURFACE PROPERTIES
A Lagrangian method for calculating the dynamics of an incompressible fluid with free surface
N79-27453
Surface flashover characteristics of alumina dielectric guide cathodes in an intense relativistic electron beam accelerator
N79-27955
Radio observations of asteroids: Results and prospects
[NASA-CR-158781] N79-28075
Thickness of western mare basalts
[NASA-CR-158784] N79-28101
SURFACE REACTIONS
Adhesive material transfer in the erosion of an aluminum alloy
[NASA-TM-79165] N79-27306
Catalysis by platinum single crystal surfaces: Low pressure hydrocarbon reactions and the effects of introducing strongly bound oxygen at the surface
N79-28012
SURFACE ROUGHNESS
Roughness phenomena in turbulent flow
N79-27446
A numerical model of flow above gentle topography with changes in surface roughness
N79-27550
Turbulent structure of the urban surface boundary layer
N79-27561
SURFACE VEHICLES
Environmental assessment for the electric hybrid vehicle demonstration project, performance standards and financial incentives
[ANL/EES/TM-22] N79-27720
SURFACE WAVES
Ion implantation and its effects on the propagation of elastic surface waves
[LCR-494-305] N79-27368

Preliminary assessment of temperature induced radiosonde humidity errors and effects on apparent low-level refractive structures, block program WF 52-55-091
[AD-A068670] N79-27784
SURVEYS
Expendable bathythermograph observations from NMFS/MARAD Ship of Opportunity program for 1975
[PB-294215/9] N79-27811
SWEDEN
Seismological recordings of nuclear explosions in 1976 obtained at the Hagfors observatory in Sweden
[FOA-C-20275-I1] N79-27764
Particulate radioactivity, mainly from nuclear explosions, in air and precipitation in Sweden, mid-year 1975 to mid-year 1977
[FOA-C-40089-T2[A1]] N79-27970
SWITCHES
Crossed-field closing switch development
[AD-A068185] N79-27407
SWITCHING CIRCUITS
A voltage controlled active low pass filter
[RSRE-78013] N79-27417
SWITZERLAND
The catalogue of objective statistical weather forecasts for the northern Alps, the Valais, and northern and central Grisons
[SZ-ISSN-0080-7346] N79-27771
SYMMETRY
Globally baryon symmetric cosmology, GUT spontaneous symmetry breaking, and the structure of the universe
[NASA-TM-80306] N79-28090
SYNCHRONOUS SATELLITES
Fourteenth-order harmonics from analysis of mean longitude variations of resonant satellites
[TUM-MITT-132] N79-27223
SYNTHANE
The Texaco coal gasification process for manufacture of medium BTU gas
N79-27614
Synthetic natural gas in California: When and why --- from coal
N79-27615
SYNTHETIC FUELS
Alcohol fuels
[GPO-22-334] N79-27322
Material and energy balances in the production of ethanol from wood --- conferences
[CONF-7806139-1] N79-27338
Methanol from coal
N79-27619
SYSTEM EFFECTIVENESS
Aircraft and avionic related research required to develop an effective high-speed runway exit system
[NASA-CR-159075] N79-27185
SYSTEMS ANALYSIS
A systems examination of the opportunities of coal for California
N79-27600
Manual for the Solar Total Energy System Evaluation Program
[SAND-78-7045] N79-27682
The systemic principles of building a man-machine control staff --- functional analysis
N79-27861
SYSTEMS ENGINEERING
Definition, description, and interfaces of the FAA's developmental programs. Volume 1: Overview
[AD-A068226] N79-27117
Erectable space platform for space sciences and applications
[NASA-CR-159091] N79-27217
Ocean Thermal Energy Conversion [OTEC] platform configuration and integration. Volume 2: Conceptual design
[DOE/ET/4064-1-VOL-2] N79-27697
Design guidelines for large photovoltaic arrays
[SAND-79-7001] N79-27698
LLL Octopus network: Some lessons and future directions
[UCRL-81067] N79-27885
Computer software for planning design of community energy systems
[CONF-781182-2] N79-28063
SYSTEMS MANAGEMENT
Definition, description, and interfaces of the FAA's developmental programs. Volume 1: Overview
[AD-A068226] N79-27117
Electric utilities and solar energy: The service contract in a new social context
[ORAU/IEA[O]-79-3] N79-27685

T

TABLES [DATA]
Calculation of the attenuation as a function of rainfall intensity for several polarizations
[FUB-43-1977] N79-27382
Seismological bulletin of the seismograph stations in the Netherlands, volume 59, 1971
[KNMI-108-59] N79-27765
Precipitation, 1977
[KNMI-117-77] N79-27795
Oceanographical observations from Danish light-vessels and coastal stations
[ISBN-87-7478-151-0] N79-27809
A table of miscellaneous thermodynamic properties for various substances with emphasis on the critical properties
[MPIS-6/1978] N79-28040
Catalogue of 'strict 0.01 mag photometric star boxes'
[PUBL-SER-B-FASC-2] N79-28081
TACAN
Guidance and control for tactical guided weapons with emphasis on simulation and testing
[AGARD-LS-101] N79-27225
Tactical missile performance requirements: A methodology for development
N79-27226
New methods in the terminal guidance and control of tactical missiles
N79-27228
TAIL SURFACES
Pressure distributions on three different cruciform aft-tail control surfaces of a wingless missile at mach 1.60, 2.36, and 3.70 Volume 1: Trapezoidal tail --- conducted in Langley Unitary Plan wind tunnel
[NASA-TM-80097] N79-27099
TAKEOFF
Aircraft and avionic related research required to develop an effective high-speed runway exit system
[NASA-CR-159075] N79-27185
TANTALUM COMPOUNDS
Hydrogen diffusion and electronic structure parameters in tantalum hydrides determined by pulsed NMR measurements
[IS-M-178] N79-28029
TARGET ACQUISITION
Formation tracking, part 1: Basic theory and formation track initiation
[FFM-265] N79-27373
TARGET SIMULATORS
Planning, execution and statistical evaluation of hit simulations
N79-27214
TECHNOLOGICAL FORECASTING
The 1990 system characteristics and requirements
N79-27113
Airfreight forecasting methodology and results
N79-27114
TECHNOLOGY ASSESSMENT
State of the art survey of technologies applicable to NASA's aeronautics, avionics and controls program
[NASA-CR-159050] N79-27087
The 1990 system characteristics and requirements
N79-27113
Earth-to-orbit reusable launch vehicles: A comparative assessment
[NASA-CR-157444] N79-27192
Erectable space platform for space sciences and applications
[NASA-CR-159091] N79-27217
Nuclear powered satellite studies
[COO-4045-3] N79-27221
Coal liquefaction: Report on a focus group discussion
[DOE/TIC-10039] N79-27339
High-power gas lasers, volume 1
[VKI-LECTURE-SERIES-65-VOL-1] N79-27488
Gas dynamic lasers: Theory, experiment and the state-of-the-art
N79-27489
High-power gas lasers, volume 2
[VKI-LECTURE-SERIES-65-VOL-2] N79-27491
Proceedings of the Conference on Coal Use for California
[NASA-CR-158770] N79-27597
Study of membrane reflector technology
[NASA-CR-158729] N79-27655
Proceedings of the Distribution Automation and Control Working Group. Volume 2: Proceedings
[NASA-CR-158769] N79-27659
Demands and effects of solar technology on electric power storage
[AED-CONF-78-155-047] N79-27678
Environmental readiness document. Small scale low head hydro: Commercialization, phase 3 planning
[DOE/ERD-0009] N79-27686
Storage systems analysis --- Solar Thermal Power Program
[SERI/PR-35-101] N79-27705
Powersat: An evaluation
[TUM-LRT-TB-22/2] N79-27707
The application of atmospheric electricity concepts and methods to other parts of meteorology
[WMO-507] N79-27792
Space biology and aerospace medicine, v. 13, no. 3, 1979
[JPRS-73784] N79-27817
TECHNOLOGY UTILIZATION
Lasers: Their applications and operational requirements
N79-27494
Federal photovoltaic utilization program. Planning resource document
[HCP/M50081-01] N79-27706
TECTONICS
The effect of a moving lithospheric plate on convection in the Earth's mantle
N79-27736
Seismic stratigraphy and basin development, Nestos Delta area, northeastern Greece
N79-27739
Geology of the passive margin of New England
[PB-294473/4] N79-27768
TEETERING
A flight investigation of basic performance characteristics of a teetering-rotor attack helicopter
[NASA-TM-80112] N79-27097
TELEMETRY
Drive program documentation
[NASA-CR-160252] N79-27233
TELEPHONY
Video transmission with reduced information rate [picture compression]. A system with source coding for transmission of video signals for portrait videotelephone
[BMFT-FB-T-78-50] N79-27384
TELESCOPES
The prototype low-energy telescope system for the international solar COSPIN experiment
[ESA-STR-202] N79-27989
TELLURIC CURRENTS
Electromagnetic induction in a conducting plate with a charged vertical finite cylinder
[GAMMA-30] N79-27757
TELLURIC LINES
Referenced magnetotellurics with SQUIDS
N79-27742
TEMPERATURE DEPENDENCE
Static and dynamic frequency: Temperature characteristics of quartz vibrators
[AD-A068630] N79-27409
TEMPERATURE EFFECTS
Effects of moisture on torsion and flexure properties of graphite-epoxy composites
[NASA-TM-78597] N79-27243
Elevated temperature ductility of types 304 and 316 stainless steel
[CONF-781202-38] N79-27298
Thermoplastic materials corrosion in 40% KOH [120 C - 180 C]
[PJ539/77/26] N79-27315
Passivation of high voltage power devices by thermal oxidation
[BMFT-FB-T-78-23] N79-27426
Analysis of charring ablators
N79-27447
Assessment of materials for use in a solar ceramic receiver for chemical process heat
[ORNL/TM-6715] N79-27681
TEMPERATURE GRADIENTS
Vertical changes in stability conditions within the first 100 meters: Tennessee Valley
N79-27596
Numerical simulation of VTPR temperature retrievals in a severe storm environment
[NASA-CR-158761] N79-27770
TEMPERATURE MEASUREMENT
Evaluation of miniature single-wire sheathed thermocouples for turbine blade temperature measurement
[NASA-TM-79173] N79-27480
The Tergra model: A mathematical model for the simulation of the daily behavior of crop surface temperature and actual evapotranspiration
[REPT-1014] N79-27645
Temperature measurements in the TORMAC 4-C plasma
N79-27993
TEMPERATURE MEASURING INSTRUMENTS
Diphenyl ether triple point cells
[NPL-CHEM-86] N79-27289
TEMPERATURE SENSORS
Analysis and preliminary design of optical sensors for propulsion control --- temperature sensors
[NASA-CR-159519] N79-27975
TENNESSEE VALLEY [AL-KY-TN]
Vertical changes in stability conditions within the first 100 meters: Tennessee Valley
N79-27596
TENSILE TESTS
Investigation on the effect the strain ratio has on sheet metal formability
N79-27291
TENSOR ANALYSIS
Physical components of tensors
N79-27896
TERMINAL GUIDANCE
New methods in the terminal guidance and control of tactical missiles
N79-27228
TERRAIN
Terrain and ionospheric effects on EHT transmissions to a SARSAT spacecraft
[CRC-1324] N79-27354
Modelling the effect of separated wakes behind hills and buildings on pollutant dispersion
N79-27549

Development and validation of a three-dimensional wind model for air quality analysis in complex terrain N79-27551
Bivane studies of air flow over irregular terrain N79-27552

TEST EQUIPMENT
Design of automatic test equipment for developmental TWT's [AD-A067553] N79-27404

TEST FACILITIES
A new facility for structural engine testing N79-27173
Midtemperature Solar Systems Test Facility test results: Effects of severe hailstorm on 9 August 1978 [SAND-78-2182] N79-27680

TEXAS
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington [E79-10212] N79-27629
Summary of Meteorological Observations, Surface [SMOS] Corpus Christi, Texas [AD-A067679] N79-27781

THEOREM PROVING
On the Gaussian measure of symmetric convex sets [CTH-MATH-1978-10-2] N79-27927

THEOREMS
Some theorems and counterexamples in monotone approximation N79-27893

THEORETICAL PHYSICS
Review of neutrino physics at Brookhaven [BNL-25378] N79-27948
On the existance of physical spaces with a dimensionality of N not equals 3 + 1 [PR-400] N79-28041

THEORIES
The NASTRAN theoretical manual [level 16.0] [NASA-SP-221[03]] N79-27531

THERAPY
Effects of vibration on the human organism N79-27862

THERMAL DEGRADATION
Nonmetallic materials handbook. Volume 1: Epoxy materials [NASA-CR-3133] N79-27307

THERMAL ENERGY
The effects of regional insolation differences upon advanced solar thermal electric power plant performance and energy costs [NASA-CR-158768] N79-27660
Modeling passive solar buildings with hand calculations --- conferences [LBL-8583] N79-27683
Total scattering cross sections for He[2[1]S, 2[3]S] on He, Ne, Ar, Kr in the thermal energy region [MPIS-7/1978] N79-27951

THERMAL FATIGUE
A contribution on thermal fatigue in cooled turbine blading N79-27153
Pressure contact use on high-power semiconductor devices free of thermal fatigue [BMFT-FB-T-78-02] N79-27418

THERMAL MAPPING
Synoptic radio maps of the sun at 3.3mm, 1970-1973 [UAG-66] N79-28106

THERMAL PROTECTION
A thermal control approach for a solar electric propulsion thrust subsystem [NASA-TM-79175] N79-27236
Analysis of charring ablators N79-27447

THERMAL STRESSES
Correlation of predicted and measured thermal stresses on an advanced aircraft structure with dissimilar materials --- hypersonic heating simulation [NASA-TM-72865] N79-27088
Technical support for GEIS: Radioactive waste isolation in geologic formations. Volume 20: Thermomechanical stress analysis and development of thermal loading guidelines [Y/OWI/TM-36/20] N79-27967

THERMOCHEMICAL PROPERTIES
Nonmetallic materials handbook. Volume 1: Epoxy materials [NASA-CR-3133] N79-27307

THERMOCOUPLES
Evaluation of miniature single-wire sheathed thermocouples for turbine blade temperature measurement [NASA-TM-79173] N79-27480

THERMODYNAMIC CYCLES
Stirling Engines [VKI-LECTURE-SERIES-53] N79-27502
Stirling engines N79-27503

THERMODYNAMIC EQUILIBRIUM
Thermodynamic analysis of equilibrium phase relations among minerals and aqueous solutions in metasomatic processes N79-28033
Molecular thermodynamics of vapor-liquid and liquid-liquid equilibra --- maximum likelihood estimates N79-28036

THERMODYNAMIC PROPERTIES
The influence of error introduced by thermal stable thermodynamic and kinetic reaction variables on the solution of equations for two-dimensional laminar hypersonic boundary layers [KU-RZ-10/1977] N79-27105
High temperature properties of sintered alpha silicon carbide [CONF-7810129-2] N79-27251
Vapor liquid equilibria for the systems water-methanol, waterethanol, methanol-ethanol, and water-methanol-ethanol at 298.15 K determined by a rapid transpiration method [NPL-CHEM-95] N79-27290
Potentialities for an improvement of the efficiency of fluorescent mercury lamps [BMFT-FB-T-78-22] N79-27425
Advanced theory of the Stirling cycle digital simulation of regenerative engine operation N79-27504
Thermal performance evaluation of the Semco [liquid] solar collector [NASA-CR-161230] N79-27656
Indoor test for thermal performance evaluation of seven Elcam fin-tube solar collector configurations [NASA-CR-161236] N79-27657
Assessment of materials for use in a solar ceramic receiver for chemical process heat [ORNL/TM-6715] N79-27681
Chemical interaction of aqueous solutions with epidote-feldspar mineral assemblages in geologic systems N79-27741
A table of miscellaneous thermodynamic properties for various substances with emphasis on the critical properties [MPIS-6/1978] N79-28040
Thermodynamic methods for determining losses in hydraulic components: A survey [NEL-657] N79-28042
Relationship of PVT conditions and specific heat capacity of oils for thermodynamic measurements [NEL-658] N79-28043

THERMODYNAMICS
Thermal rate constants, energy dependence and isotope effect for laser initiated halogen-hydrogenhalide reactions N79-27253
New instrumental, mathematical, and chemical developments for kinetic methods of analysis N79-27267
Technical support for GEIS: Radioactive waste isolation in geologic formations. Volume 20: Thermomechanical stress analysis and development of thermal loading guidelines [Y/OWI/TM-36/20] N79-27967

THERMOELASTICITY
Steam turbine rotor reliability: Task details [EPRI-NP-923] N79-27520

THERMOELECTRIC GENERATORS
Market assessment of fuel cell total energy systems [ORNL/CON-36] N79-27704

THERMONUCLEAR EXPLOSIONS
Particulate radioactivity, mainly from nuclear explosions, in air and precipitation in Sweden, mid-year 1975 to mid-year 1977 [FOA-C-40089-T2[A1]] N79-27970

THERMONUCLEAR REACTIONS
Thermonuclear reaction rates in a deuterium-tritium plasma [FOA-C-20283-A2] N79-28044

THERMOPLASTIC RESINS
Thermoplastic materials corrosion in 40% KOH [120 C - 180 C] [P/539/77/26] N79-27315

THICKNESS
Thickness of western mare basalts [NASA-CR-158784] N79-28101

THIN FILMS
An investigation of vibration dampers in gas-turbine engines N79-27164
A study of the conduction mechanisms in thin polymeric films with an application to the passivation of semiconductor components N79-27399
Evaluation of a self-calibrating silicon bolometer [AD-A068083] N79-27484
Depth profiling of the magnetic hyperfine field in ultra-thin films of iron N79-28020
Interface and electron tunneling properties of thin oxides on silicon N79-28023

THREE DIMENSIONAL BOUNDARY LAYER
Experiments on the stability and transition of two-dimensional and three-dimensional boundary layers with suction [NASA-CR-157256] N79-27464

THREE DIMENSIONAL FLOW
Numerical evaluation of transonic equivalence rule [AD-A067902] N79-27101
A three-dimensional model of co-rotating streams in the solar wind. 2: Hydrodynamic streams [NASA-TM-80276] N79-28110

THRUST AUGMENTATION
Earth-to-orbit reusable launch vehicles: A comparative assessment [NASA-CR-157444] N79-27192

THRUST CHAMBERS
Design, manufacturing, and testing of spacecraft thrust cone made of Carbon Fiber Reinforced Plastic [CFRP] [EMSB-79/78] N79-27240

THRUST VECTOR CONTROL
Thrust vector control N79-27206

THUNDERSTORMS
Thunderstorm gust fronts: Observations and modeling [AD-A068425] N79-27773

THYROID GLAND
Morphological distinctions of the rat thyroid and parathyroid following long-term space flights N79-27835

TIDES
A theory for portions of the energy spectrum and for intermittency of fine-scale turbulence [AD-A068743] N79-27466

TILTED PROPELLERS
The influence of feedback on the aeroelastic behavior of tilt proprotor aircraft including the effects of fuselage motion [NASA-CR-158778] N79-27125

TIME DEPENDENCE
Time dependent methods for multi-dimensional compressible flow problems N79-27450

TIME FUNCTIONS
Indicial response invariance in discrete time variable systems [FUB-42-1977] N79-27912

TIME OPTIMAL CONTROL
Classification of multispectral images of natural resources using table look-up approach and clustering [INPE-1439-TDL/006] N79-27642

TIME SERIES ANALYSIS
Average winter temperatures at De Bilt [the Netherlands]: 1634 - 1977 [KNMI-V-305] N79-27796
Investigation of a multiple time series model [AD-A067770] N79-27900
Multiple time series modeling 2 [AD-A067644] N79-27901

TISSUES [BIOLOGY]
Dose-effect relationships for ultrasound irradiation of brain tissue N79-27812
Preparation of guinea pig macrophage for electrophoretic experiments in space [NASA-CR-158777] N79-27814
Tissular metabolism in mixed type fibers of rat skeletal muscles after flight aboard Cosmos-690 biosatellite N79-27823
Apparatus and method of inserting a microelectrode in body tissue or the like using vibration means [NASA-CASE-NPO-13910-1] N79-27836

TITANIUM ALLOYS
Impact damage on titanium leading edges from small hard objects [AD-A068458] N79-27293

TOKAMAK DEVICES
An EUV study of impurities in the Alcator A tokamak N79-27996
Bending free toroidal shells for tokamak fusion reactors with nonideal magnetic field distributions [CONF-781202-36] N79-28001
Design improvements simplify remote maintenance of tokamaks --- conferences [CONF-781105-86] N79-28003

TOLERANCES [PHYSIOLOGY]
Animal endurance to recurrent impact accelerations N79-27833

TOPOGRAPHY
A numerical model of flow above gentle topography with changes in surface roughness N79-27550
The effect of an arbitrary topography on compressible, stably stratified, vertically sheared flow on the Beta plane N79-27802

TOPOLOGY
A simple method to increase the robustness of t-type interval estimators in some practical situations N79-27915

TORNADOES
Wind field and trajectory models for tornado-propelled objects [NASA-CR-158775] N79-27091

TOROIDAL PLASMAS
High beta plasmas in toroidal Surmacs N79-27991
Temperature measurements in the TORMAC 4-C plasma N79-27993
Density and magnetic field measurements in the Tormac IV-c plasma N79-27995

ELMO Bumpy Torus. Alternate concepts development program
[CONF-7810127-1] N79-27999
Proposal for a modification of SPICA
[REPT-78-112] N79-28006
TOROIDAL SHELLS
Bending free toroidal shells for tokamak fusion reactors with nonideal magnetic field distributions
[CONF-781202-36] N79-28001
TORSIONAL VIBRATION
Vibration of bearings
[NASA-TT-F-679] N79-27501
TORUSES
ELMO Bumpy Torus. Alternate concepts development program
[CONF-7810127-1] N79-27999
TOXICITY
Toxicity of oxygen mixed with helium
N79-27829
TRACE CONTAMINANTS
Multidimensional high resolution gas liquid chromatography in trace organic analysis: Heartcutting with intermediate trapping
N79-27273
The synthesis of organic reagents for the trace analysis of air pollutants
N79-27714
TRACE ELEMENTS
New sets of diffusion parameters resulting from tracer experiments in 50 and 100 metres release height
N79-27564
Results of SF6 tracer diffusion experiments next to a power plant
N79-27565
TRAFFIC CONTROL
Lightning protection for traffic control systems
[NASA-CR-158779] N79-27401
TRAILING-EDGE FLAPS
Trailing edge noise data with comparison to theory
[NASA-TM-79208] N79-27930
TRAINING SIMULATORS
Description of the TC 125 aboard the Mercury simulator
[NASA-TM-75479] N79-27198
TRAJECTORY ANALYSIS
Wind trajectory models
[KNMI-WR-78-6] N79-27787
TRAJECTORY OPTIMIZATION
The computation of optimal aircraft trajectories
[RE-577] N79-27128
Computation of minimum noise aircraft landing trajectories
[NASA-CR-158931] N79-27929
TRANSDUCERS
A study of response time of pitot pressure probes designed for rapid response and protection of transducer
[NASA-TM-80091] N79-27462
TRANSFER FUNCTIONS
The transfer function and Brownian noise of the gravitational antenna
[LPS-78-1] N79-27380
Backward solution of nonlinear differential equations. Part 2: Nonlinear equations with forced functions
[FOA-C-20284-E3] N79-27909
Studies of the acoustic transmission characteristics of coaxial nozzles with inverted velocity profiles: Comprehensive data report --- nozzle transfer functions
[NASA-CR-159628] N79-27933
TRANSFORMATIONS (MATHEMATICS)
A simple method to increase the robustness of t-type interval estimators in some practical situations
N79-27915
Study of a method for filtering optical images
[BNWL-TR-343] N79-27979
TRANSIENT RESPONSE
HSLAB: An interactive program for one dimensional heat flow problems
[FOA-C-20288-D6(A3)] N79-27474
TRANSISTOR AMPLIFIERS
Monolithic microwave preamplifier
[AD-A063190] N79-27406
Monolithic 20w 2GHz transistor and monolithic 5w 4GHz transistor
[AD-A068165] N79-27408
TRANSISTORS
Power converter --- for display devices, lighting equipment
[NASA-CASE-FRC-11014-1] N79-27395
Monolithic 20w 2GHz transistor and monolithic 5w 4GHz transistor
[AD-A068165] N79-27408
TRANSITION METALS
Orbital interactions in molecules studied by ultraviolet photoelectron spectroscopy --- ionization potentials and metal-metal bonding in transition metal carbonyl complexes
N79-27939
TRANSITION PROBABILITIES
Local neighborhood transition probability estimation and its use in contextual classification
[NASA-CR-160261] N79-27916
TRANSITION TEMPERATURE
Transitions above the glass transition temperature in amorphous polymers
N79-27299
TRANSLATIONAL MOTION
The unsteady aerodynamics of a cascade in translation
N79-27180
TRANSMISSION LINES
Three-phase UHV ac transmission research
[EPRI-EL-823] N79-27411
TRANSONIC FLOW
An exploratory study of a finite difference method for calculating unsteady transonic potential flow
[NASA-TM-80105] N79-27096
Numerical evaluation of transonic equivalence rule
[AD-A067902] N79-27101
Calculation of skin friction in two-dimensional, transonic, turbulent flow --- computer programs
[AD-A067423] N79-27102
Design of shock-free transonic flow in turbomachinery
[AD-A067703] N79-27144
TRANSPARENCE
Development of opto-electronic methods for the investigation of the optical and mechanical parameters of transparent materials
N79-27974
TRANSPIRATION
Vapor liquid equilibria for the systems water-methanol, waterethanol, methanol-ethanol, and water-methanol-ethanol at 298.15 K determined by a rapid transpiration method
[NPL-CHEM-95] N79-27290
TRANSPONDERS
The DABS calibration performance monitoring equipment
[AD-A069126] N79-27120
TRANSPORT AIRCRAFT
Engine performance considerations for the large subsonic transport
N79-27139
TRANSPORT PROPERTIES
Transport studies of ion exchange membranes
N79-27268
Measurement of transport properties of several N-alkylpyridinium halides and their mixtures with aluminum chloride
[AD-A067763] N79-27280
A numerical fluid dynamics calculation method for all flow speeds
N79-27454
Valley circulation influence on tall stack dispersion from a ridge location
N79-27545
The digital simulation of areal salt transport to evaluate water management proposals in a coastal aquifer
N79-27803
Mass transport in arteries
N79-27848
Transport properties in the atmosphere of Jupiter
[NASA-CR-158783] N79-28100
TRANSPORT THEORY
A summary of research on the NASA-Global Atmospheric Sampling Program performed by the Atmospheric Sciences Research Center --- ozone transport theory
[NASA-CR-159614] N79-27716
TRANSPORTATION
The 1990 system characteristics and requirements
N79-27113
Prospects for coal slurry pipelines in California
N79-27608
TRAVELING WAVE TUBES
Design of automatic test equipment for developmental TWT's
[AD-A067553] N79-27404
TRITIUM
Advice on the setting up of a workshop for treating tritium gas light sources at 527 ECW at Dongen
N79-27344
Thermonuclear reaction rates in a deuterium-tritium plasma
[FOA-C-20283-A2] N79-28044
TROILITE
I-Xe dating of silicate and troilite from IAB iron meteorites
N79-28095
TROPOSPHERE
A summary of research on the NASA-Global Atmospheric Sampling Program performed by the Atmospheric Sciences Research Center --- ozone transport theory
[NASA-CR-159614] N79-27716
TROPOSPHERIC WAVES
Tropospheric limitations on the accuracy of phase measurement of coordinates in astronomy
[NASA-TM-75480] N79-28073
TRUCKS
Diesel organic rankine cycle compound engine (Bottoming Cycle) program plan
[DOE/CS-0052] N79-27521
TUMORS
Preparation of guinea pig macrophage for electrophoretic experiments in space
[NASA-CR-158777] N79-27814
TUNGSTEN
Dissolution processes of aluminum oxide on tungsten, iridium, molybdenum, tantalum, and rhenium as a function of electric field strength
N79-28013
TURBINE BLADES
Flow visualization of discrete-hole film cooling with spanwise injection over a cylinder
[NASA-TP-1491] N79-27142
A contribution on thermal fatigue in cooled turbine blading
N79-27153
Three-dimensional finite-element techniques for gas turbine blade life prediction
N79-27156
Some theoretical and experimental investigations of stresses and vibrations in a radial flow rotor
N79-27158
Determining the dynamic response due to an imbalance at the attachments of a motor on a pod --- caused by rotor blade loss
N79-27171
Evaluation of miniature single-wire sheathed thermocouples for turbine blade temperature measurement
[NASA-TM-79173] N79-27480
Aerodynamic performance of the 17-metre-diameter Darrieus wind turbine
[SAND-78-1737] N79-27670
TURBINE ENGINES
Turbine engine altitude chamber and flight testing with liquid hydrogen
[NASA-TM-79196] N79-27140
The analysis of engine vibrations
N79-27150
Forecasting engine life
N79-27154
Small turbines: Experiences with disk ruptures
N79-27163
Rotor bust protection: Design guidelines for containment
N79-27166
Small turbine engine integration in aircraft installations
N79-27170
Determining the dynamic response due to an imbalance at the attachments of a motor on a pod --- caused by rotor blade loss
N79-27171
TURBINE WHEELS
Reliability of steam turbine rotors
[EPRI-NP-923-SY] N79-27519
TURBINES
Calculation of stress concentrations in disc alveoles --- viscoplasticity of turbine disks
N79-27157
Steam turbine rotor reliability: Task details
[EPRI-NP-923] N79-27520
TURBOCOMPRESSORS
Unsteady rotor blade loading in an axial compressor with steady-state inlet distortions
N79-27176
Distortions, rotating stall and mechanical solicitations
N79-27177
Review of the AGARD S and M panel evaluation program of the NASA-Lewis SRP approach to high-temperature LCF life prediction
N79-27179
Unsteady Flows in Axial Flow Compressors
[VKI-LECTURE-SERIES-20] N79-27429
Rotating stall in axial flow compressors
N79-27430
Experimental techniques for analyzing unsteady flow in revolving machinery
N79-27433
The functioning of axial compressors without adaptation. The uncoupling boundary and revolving separation
N79-27434
Axial compressor stall --- effects on aircraft engines
N79-27435
TURBOFAN ENGINES
Integration of an airframe with a turbofan and afterburner system
N79-27172
The effect of intake conditions on supersonic flutter in turbofan engines
N79-27175
TURBOFANS
Noise from industrial fans
N79-27511
TURBOMACHINE BLADES
The contribution of photoelasticity measurement to the study of turbine parts
N79-27152
TURBOMACHINERY
Design of shock-free transonic flow in turbomachinery
[AD-A067703] N79-27144

Study of two heat resistant nickel alloys for turbomachine plates
[REPT-20-393] N79-27147
Unsteady flow in turbomachines
N79-27432
Noise in Turbomachines
[VKI-LECTURE-SERIES-81] N79-27509
A review on fundamentals of acoustic wave theory and noise generation
N79-27510
Acoustic silencers for inlet and exhaust of turbomachinery
N79-27514

TURBULENCE
A theory for portions of the energy spectrum and for intermittency of fine-scale turbulence
[AD-A068743] N79-27466

TURBULENT BOUNDARY LAYER
Investigation of wall pressure fields beneath turbulent boundary layers
[MPIS-11/1978] N79-27108
AGARD-VKI Short Course on Hypersonic Boundary Layers
[VKI-LECTURE-SERIES-12] N79-27437
Hypersonic boundary layers
N79-27441
Hypersonic turbulent boundary layers without mass addition
N79-27444
Hypersonic turbulent boundary layers with mass addition
N79-27445
Roughness phenomena in turbulent flow
N79-27446
Turbulent structure of the urban surface boundary layer
N79-27561

TURBULENT FLOW
Calculation of skin friction in two-dimensional, transonic, turbulent flow --- computer programs
[AD-A067423] N79-27102
Roughness phenomena in turbulent flow
N79-27446
Tropospheric limitations on the accuracy of phase measurement of coordinates in astronomy
[NASA-TM-75480] N79-28073

TURBULENT MIXING
Mixing and kinetic processes in pulverized coal combustors
[EPRI-FP-806-SY] N79-27330

TWO DIMENSIONAL BOUNDARY LAYER
The influence of error introduced by thermal stable thermodynamic and kinetic reaction variables on the solution of equations for two-dimensional laminar hypersonic boundary layers
[KU-RZ-10/1977] N79-27105
Experiments on the stability and transition of two-dimensional and three-dimensional boundary layers with suction
[NASA-CR-157256] N79-27464
Stability of the coincidence set for the Signorini problem
N79-27889

TWO DIMENSIONAL FLOW
Calculation of skin friction in two-dimensional, transonic, turbulent flow --- computer programs
[AD-A067423] N79-27102
Effective difference method for solving non-stationary two dimensional hypersonic flow boundary layer problems under chemical nonequilibrium conditions
[KU-RZ-9/1977] N79-27104
Computation of potential flow around bodies
N79-27456

U

U.S.S.R.
Space biology and aerospace medicine, v. 13, no. 3, 1979
[JPRS-73784] N79-27817
Translations on USSR science and technology: Biomedical and behavioral sciences, no. 81
[JPRS-73729] N79-27860

U.S.S.R. SPACE PROGRAM
Energetic electron fluxes in the earth's outer magnetosphere according to observations from the Prognoz-3 station
[PR-415] N79-27763
On the reliability of heavy ion detection in the plasma flow near M
[PR-427] N79-28093

ULTRAHIGH FREQUENCIES
Theory and experiments on precision L-band DMF
[FUB-44-1977] N79-27124

ULTRAHIGH VACUUM
Three-phase UHV ac transmission research
[EPRI-EL-823] N79-27411
The use of molecular sprays in ultrahigh vacuum for GaAs monocrystalline growth applications
[LCR-2251-DK-PT-1] N79-28031

ULTRASONIC FLAW DETECTION
Ultrasonic pattern recognition study of intergranular stress corrosion cracks vs weld crown reflectors in SS piping
[EPRI-NP-891] N79-27297

ULTRASONIC RADIATION
Dose-effect relationships for ultrasound irradiation of brain tissue
N79-27812

ULTRASONIC TESTS
Ultrasonic inspection of engine nacelle structure searching for cracks
[REPT-7610.909] N79-27522
Ultrasonic inspection of wing spar attachment joints and lugs in viscount aircraft
[REPT-7610.910] N79-27523
Acoustical speckle interferometry
[AD-A067664] N79-27935
A low temperature ultrasonic study of hydrogen in niobium
N79-28019

ULTRAVIOLET ABSORPTION
The identification and quantitation of UV absorbing compounds in serum by reversed-phase high performance liquid chromatography
N79-27269

ULTRAVIOLET RADIATION
New developments for vidicon-based uv-visible spectrometers
N79-27476
Acceptable radiation levels in the ultraviolet visible infrared regions
[IZF-1978-15] N79-27853
Study on the ultraviolet radiation of the atmosphere of Venus --- venera 11 and 12 observations
N79-28098

ULTRAVIOLET SPECTRA
Extreme ultraviolet diagnosis of a neutral-beam-heated mirror machine
N79-27994
A phase study of a grazing incidence solar telescope. Volume 1: Executive summary
[ESS/SS-814-VOL-1] N79-28082
GRIST: A study of a grazing incidence solar telescope. Volume 2: Technical report
[ESS/SS-814-VOL-2] N79-28083

ULTRAVIOLET SPECTROMETERS
Balloon borne ultraviolet spectrometer
[AD-A067688] N79-27482

ULTRAVIOLET SPECTROSCOPY
Orbital interactions in molecules studied by ultraviolet photoelectron spectroscopy --- ionization potentials and metal-metal bonding in transition metal carbonyl complexes
N79-27939
An EUV study of impurities in the Alcator A tokamak
N79-27996

UNDERGROUND STORAGE
Underground storage of natural gas by interstate pipeline companies for 1976 and winter 1976 - 1977
[DOE/EIA-0151] N79-27684
Geohydrologic investigations of buried metamorphic rock and mudstone for the storage of radioactive waste
[DP-MS-79-13] N79-27961
Probabilistic safety analysis for solidified high-level nuclear waste management systems
[NUREG-CR-0577] N79-27962
Technical support for GEIS: Radioactive waste isolation in geologic formations. Volume 20: Thermomechanical stress analysis and development of thermal loading guidelines
[Y/OWI/TM-36/20] N79-27967

UNDERWATER ACOUSTICS
A numerical model of acoustic fluctuations for single- and paired-path transmissions in real and canonical oceans
N79-27801
Ray calculations of ocean sound channels using a pocket programmable calculator and extended forms of the Hirsch-Carter mathematical model with tables of the incomplete beta function
[AD-A069168] N79-27936

UNDERWATER TESTS
Standard operating procedures, water immersion facility, revision B
[NASA-CR-160257] N79-27199

UNITED STATES OF AMERICA
Electrical group impedance measurements in the United States between 200 and 415 kHz
[AD-A068088] N79-27352
Re-examination of undiscovered oil resources in the United States
[DOE/EIA-0103/9] N79-27643

UNIVERSE
Globally baryon symmetric cosmology, GUT spontaneous symmetry breaking, and the structure of the universe
[NASA-TM-80306] N79-28090

UNIVERSITY PROGRAM
Activities of the Laboratory of Electromagnetic Theory
N79-27367
Research in space physics at the University of Iowa
[NASA-CR-158782] N79-28065

UNSTEADY FLOW
An exploratory study of a finite difference method for calculating unsteady transonic potential flow
[NASA-TM-80105] N79-27096
Unsteady rotor blade loading in an axial compressor with steady-state inlet distortions
N79-27176
Distortions, rotating stall and mechanical solicitations
N79-27177
Unsteady Flows in Axial Flow Compressors
[VKI-LECTURE-SERIES-20] N79-27429
Unsteady flows --- flow equations
N79-27431
Unsteady flow in turbomachines
N79-27432
Experimental techniques for analyzing unsteady flow in revolving machinery
N79-27433
The functioning of axial compressors without adaptation. The uncoupling boundary and revolving separation
N79-27434
Pulsatile flow through an orifice
[PB-292194/8] N79-27475

URANUS [PLANET]
The 10 February 1977 lunar occultation of Uranus. Radius, limb darkening, and polar brightening at 6900 A
[NASA-CR-158780] N79-28074

URBAN DEVELOPMENT
Department of Housing and Urban Development, independent agencies appropriation bill, 1980 --- congressional reports
[S-REPT-96-258] N79-28057

URBAN PLANNING
Computer software for planning design of community energy systems
[CONF-781182-2] N79-28063

URBAN RESEARCH
Determination of homogeneous zones by remote sensors
[INPE-1470-RPE/021] N79-27641

USER MANUALS (COMPUTER PROGRAMS)
Drive program documentation
[NASA-CR-160252] N79-27233
User manuals for three computer programs for analysis of composite materials [LOPT, SOPT, SOC]
[FFA-TN-HU-2054] N79-27252
NASCAP user's manual, 1978
[NASA-CR-159417] N79-27398
Evaluation of registration, compression and classification algorithms. Volume 2: Documentation
[NASA-TM-78227-VOL-2] N79-27631
Manual for the Solar Total Energy System Evaluation Program
[SAND-78-7045] N79-27682
Roscoe user guide, version 1.1
[AD-A068864] N79-27883

UTILITIES
Assessment of load management on the electric power system --- conferences
[CONF-781182-3] N79-27412
Electric utilities and solar energy: The service contract in a new social context
[ORAU/IEA(O)-79-3] N79-27685
Solar Heating and Cooling Of Buildings (SHACOB) requirements definition and impact analysis
[EPRI-ER-808-VOL-1] N79-27687
Grip-connected integrated community energy system. Phase 2: Detailed feasibility and preliminary design, stage 2
[COO-4337-2/2] N79-27701

UTILIZATION
Prospects for heavy/medium duty automotive stirling engines
N79-27505

V

V/STOL AIRCRAFT
Performance of a V/STOL tilt nacelle inlet with blowing boundary layer control
[NASA-TM-79176] N79-27093
Aeronautical research into vertical problems in V/STOL aircraft approach landing
[IFD-4-78] N79-27134
Aerodynamics of a tilt-nacelle V/STOL propulsion system
[NASA-TM-78606] N79-27138
A comparison of the V/STOL handling qualities of the VAK-191B with the requirements of AGARD report 577 and MIL-F-83300
[NASA-TP-1494] N79-27182

VALENCE
Intervalence electron transfer in mixed-valence compounds
N79-27262

VALVES
Design considerations for improved fluidic input servovalve performance
[AD-A068977] N79-27517
VAPOR JETS
High pressure arcs in SF6. Part 1: Formation and velocity distribution of vapor jets at the electrodes
[BMFT-FB-T-78-03-PT-1] N79-27419
VAPOR PHASES
Research on elementary HO2 and OH radical reactions in the gas phase using laser magnetic resonance
[MPIS-10/1978] N79-27286
Condensation on a noncollapsing vapor bubble in a subcooled liquid
[NASA-TM-79212] N79-27461
VAPORIZING
Mass spectrometric investigation of the vaporization of sodium and potassium chromates: Preliminary results
[NASA-TM-79210] N79-27279
VARIABLE GEOMETRY STRUCTURES
A general method for the layout of ailerons and elevators of gliders and motorplanes
N79-27076
VARIABLE STARS
Rapid photometry of cataclysmic variable stars
N79-28069
VARIATIONS
Referenced magnetotellurics with SQUIDS
N79-27742
The growth of density fluctuations in a finite sized inhomogeneous plasma
N79-27992
VECTOR CURRENTS
Critical behavior of the n-vector and charged n-vector models from an exact solution to the screening approximation
N79-28016
VECTOR MESONS
SU(3) gauge theories of weak and electromagnetic interactions and strong interaction symmetry breaking
N79-27347
VECTOR SPACES
Physical components of tensors
N79-27896
On the Gaussian measure of symmetric convex sets
[CTH-MATH-1978-10-2] N79-27927
VEGETATION
Radiometric resolution for monitoring vegetation: How many bits are needed?
[NASA-TM-80293] N79-27637
VELOCITY DISTRIBUTION
High pressure arcs in SF6. Part 1: Formation and velocity distribution of vapor jets at the electrodes
[BMFT-FB-T-78-03-PT-1] N79-27419
Studies of the acoustic transmission characteristics of coaxial nozzles with inverted velocity profiles: Comprehensive data report --- nozzle transfer functions
[NASA-CR-159628] N79-27933
Two-dimensional MHD channel design
[CONF-781234-1] N79-28000
VELOCITY MEASUREMENT
Velocity measurements using a laser Doppler velocimeter on board SS Tydeman
[TPD-1978-0-2] N79-27485
Correlation techniques and optimum signal methods in laser optics radar systems and practical measurement technique possibilities
[ILR-33] N79-27499
Techniques of measurement
N79-27850
VENERA SATELLITES
Study on the ultraviolet radiation of the atmosphere of Venus --- venera 11 and 12 observations
N79-28098
VENUS [PLANET]
On the possibility of determining the Venus magnetic moment from magnetic measurements in the tail
[PR-432] N79-28105
VENUS ATMOSPHERE
Study on the ultraviolet radiation of the atmosphere of Venus --- venera 11 and 12 observations
N79-28098
VENUS PROBES
On the possibility of determining the Venus magnetic moment from magnetic measurements in the tail
[PR-432] N79-28105
VERBAL COMMUNICATION
Computer modeling of voice signals with adjustable pitch and formant frequencies
[AD-A067556] N79-27360
VERTICAL AIR CURRENTS
Minimum altitude-loss soaring in a specified vertical wind distribution
N79-27071
Bivane studies of air flow over irregular terrain
N79-27552
VERTICAL DISTRIBUTION
Sensitivity of a Gaussian plume model to the vertical dispersion parameters
N79-27585
VERTICAL TAKEOFF AIRCRAFT
A comparison of the V/STOL handling qualities of the VAK-191B with the requirements of AGARD report 577 and MIL-F-83300
[NASA-TP-1494] N79-27182
VERY HIGH FREQUENCIES
Integrated high frequency circuits
[BMFT-FB-T-78-24] N79-27427
VIBRATION
Some theoretical and experimental investigations of stresses and vibrations in a radial flow rotor
N79-27158
VIBRATION EFFECTS
Effects of vibration on the human organism
N79-27862
VIBRATION ISOLATORS
An investigation of vibration dampers in gas-turbine engines
N79-27164
VIBRATION MODE
The analysis of engine vibrations
N79-27150
VIDEO DATA
Activities of the Laboratory for Image Processing, 1978
[FOA-C-30159-E1] N79-27870
VIDEO EQUIPMENT
Video transmission with reduced information rate [picture compression]. A system with source coding for transmission of video signals for portrait videotelephone
[BMFT-FB-T-78-50] N79-27384
VIDICONS
New developments for vidicon-based uv-visible spectrometers
N79-27476
VINYLIDENE
The dependence of the piezoelectric response of poly[vinylidene] [vinylidene fluoride] on phase 1 volume fraction
[AD-A067961] N79-27310
VIRGINIA
Computer predictions of photochemical oxidant levels for initial precursor concentrations characteristic of southeastern Virginia
[NASA-TM-80111] N79-27717
The Saltville thrust decollement: Deformation of Maccrady formation evaporites
N79-27738
VISCOPLASTICITY
Calculation of stress concentrations in disc alveoles --- viscoplasticity of turbine disks
N79-27157
VISCOSITY
Dilute solution viscosity of water reducible acrylic resins
N79-27303
VISCOUNT AIRCRAFT
Ultrasonic inspection of wing spar attachment joints and lugs in viscount aircraft
[REPT-7610.910] N79-27523
VOICE DATA PROCESSING
Computer modeling of voice signals with adjustable pitch and formant frequencies
[AD-A067556] N79-27360
VOLCANOES
Mars section of remote sensing of basalts in the solar system. Chapter 2 of basaltic volcanism in the solar system
[RSL-221] N79-28097
VOLCANOLOGY
Exploration of volcanic geothermal energy resources based on rheological techniques
[DOE/ET/28453-3] N79-27676
Mars section of remote sensing of basalts in the solar system. Chapter 2 of basaltic volcanism in the solar system
[RSL-221] N79-28097
VOLTAGE CONVERTERS [DC TO DC]
Buck/boost regulator
[NASA-CASE-GSC-12360-1] N79-27394
Power converter --- for display devices, lighting equipment
[NASA-CASE-FRC-11014-1] N79-27395
VOLTAGE REGULATORS
Buck/boost regulator
[NASA-CASE-GSC-12360-1] N79-27394
VOLTERRA EQUATIONS
Space and time solution for two coupled intensity deviations from a stationary nonlinear state
N79-28004
A nonlinear hyperbolic volterra equation arising in heat flow
[AD-A068898] N79-28038
VORTICES
An examination of a group-velocity criterion for the breakdown of an idealized vortex flow
[NASA-TM-78541] N79-27436
VOYAGER PROJECT
Voyager 2 Jupiter encounter
[NASA-NEWS-RELEASE-79-86] N79-28094
Voyager 1 planetary radio astronomy observations near Jupiter
[NASA-TM-80287] N79-28103
Magnetic field studies at Jupiter by Voyager 1: Preliminary results
[NASA-TM-80288] N79-28104

W

WALL PRESSURE
Investigation of wall pressure fields beneath turbulent boundary layers
[MPIS-11/1978] N79-27108
WARNING SYSTEMS
Satellite communications for disaster relief operations
[NASA-TM-79198] N79-27351
WASHINGTON
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629
WASPALOY
Study of two heat resistant nickel alloys for turbomachine plates
[REPT-20-393] N79-27147
WASTE DISPOSAL
Space augmentation of military high-level waste disposal
[NASA-CR-158771] N79-27193
Recovery of wasted heat with centralized and distributed heat pump systems
[CONF-781202-32] N79-27696
DOE program for improvement practices for shallow burial of radioactive waste
[CONF-781109-25] N79-27958
Geohydrologic investigations of buried metamorphic rock and mudstone for the storage of radioactive waste
[DP-MS-79-13] N79-27961
Probabilistic safety analysis for solidified high-level nuclear waste management systems
[NUREG-CR-0577] N79-27962
Waste management
[DPST-78-125-2] N79-27964
Development of glass compositions for immobilization of SRP waste
[DP-1517] N79-27965
An environmental assessment of sewerage centralization with special reference to New York State
N79-28061
WASTE UTILIZATION
IEA biomass information service. Current awareness bulletin, May - June 1978 --- bibliographies
[NP-23641] N79-27334
WASTES
Satellite passive remote sensing of off-shore pollutants, volume 2
[NASA-CR-158792] N79-27634
WATER
North Stanley Polymer Demonstration Project
[BETC/RI-78/19] N79-27313
Water as a constraint to the use of coal for California
N79-27606
Computation of H2O quadrupole moment matrix elements for pressure broadening calculations
[AD-A068569] N79-27945
WATER CIRCULATION
Wind mixing in lakes
N79-27625
WATER DEPTH
Analysis of factors affecting water level recovery data
N79-27621
WATER HEATING
Comprehensive areal model of residential heating demands
[BNL-24998] N79-27692
Production of hot water with the aid of solar energy: Conditions and costs
[SIB-R-83-1978] N79-27700
WATER MANAGEMENT
The Tergra model: A mathematical model for the simulation of the daily behavior of crop surface temperature and actual evapotranspiration
[REPT-1014] N79-27645
The digital simulation of areal salt transport to evaluate water management proposals in a coastal aquifer
N79-27803
WATER POLLUTION
Theory of spectral radiance of pollutants at sea, volume 1
[NASA-CR-158791] N79-27633
Satellite passive remote sensing of off-shore pollutants, volume 2
[NASA-CR-158792] N79-27634
Remote sensing of hydrocarbon pollution
N79-27725
Amoco Cadiz: Preliminary observations of the oil spill impact on the marine environment --- conference proceedings, Brest, 7 Jun. 1978
[CNEXO-6-1978] N79-27726

WATER QUALITY
NASA JSC water monitor system: City of Houston field demonstration
[NASA-RP-1041] N79-28062
WATER RECLAMATION
Analysis of factors affecting water level recovery data
N79-27621
WATER RESOURCES
Supply-demand price coordination in water resources management
[IIASA-RR-78-11] N79-27627
WATER WAVES
Directional spectra of ocean waves from microwave backscatter: A physical optics solution with application to the short-pulse and two-frequency measurement techniques
[NASA-TM-80295] N79-27636
Wind and wave climate in the Netherlands sector of the North Sea between 53 deg and 54 deg north latitude
[KNMI-WR-78-9] N79-27791
A comparison of simulated and experimental wave spectra in the nearshore region
[NASA-TM-80478] N79-27806
Comparison of model and observed nearshore circulation
[ANL/EES-CP/22] N79-27808
WAVE ATTENUATION
HF channel simulator for wideband signals deviative absorption and groundwave attenuation in the HF channel, addendum 1
[AD-A067906] N79-27359
WAVE DISPERSION
An experimental study of sound radiation from hyperboloidal inlet ducts
[NASA-TM-80109] N79-27931
Measurements of characteristic parameters of an optical fiber
[PUB-22-1977] N79-27987
WAVE EQUATIONS
Electromagnetic waves in free space
[INPR-1475-RPE/026] N79-27353
WAVE PACKETS
Electromagnetic waves in free space
[INPR-1475-RPE/026] N79-27353
High energy behavior of pion-nucleon-scattering partial waves from amplitude analysis
[REPT-78] N79-27969
WAVE PROPAGATION
Ion implantation and its effects on the propagation of elastic surface waves
[LCR-494-305] N79-27368
Aerospace propagation media modelling and prediction schemes for modern communications, navigation, and surveillance systems
[AGARD-LS-99] N79-27385
Propagation at medium and high frequencies. 2: Long and short-term models
N79-27392
Propagation of long radio waves in the earth's environment
N79-27393
A review on fundamentals of acoustic wave theory and noise generation
N79-27510
Wave propagation in anelastic media with applications to seismology
N79-27734
Local instabilities of Alfven waves in high speed streams
[LPS-78-2] N79-28111
WEAPON SYSTEMS
Missile Aerodynamics, volume 1
[VKI-LECTURE-SERIES-67-VOL-1]
N79-27201
A brief review of air-flight weapons
N79-27202
General weapon aerodynamics
N79-27203
WEAPONS
Missile Aerodynamics, volume 1
[VKI-LECTURE-SERIES-67-VOL-1]
N79-27201
Thrust vector control
N79-27206
Base drag
N79-27209
High incidence aerodynamics
N79-27210
WEAPONS DELIVERY
Guidance and control for tactical guided weapons with emphasis on simulation and testing
[AGARD-LS-101] N79-27225
Weapon delivery and its evaluation
N79-27227
WEATHER
Summary of Meteorological Observations, Surface [SMOS]. Lakehurst, New Jersey
[AD-A067683] N79-27782
Changes in the weather: An objective approach
[KNMI-WR-78-10] N79-27788
WEATHER FORECASTING
The application of atmospheric electricity concepts and methods to other parts of meteorology
[WMO-507] N79-27792
WEATHER STATIONS
Summary of Meteorological Observations, Surface [SMOS] Corpus Christi, Texas
[AD-A067679] N79-27781
Summary of Meteorological Observations, Surface [SMOS]. Lakehurst, New Jersey
[AD-A067683] N79-27782
Summary of Meteorological Observations, Surface [SMOS]. Imperial Beach, California
[AD-A067680] N79-27783
Continental margin atmospheric climatology and sea level 1974-1975
[PB-293734/0] N79-27799
WEATHERING
Thermal performance evaluation of the Semco [liquid] solar collector
[NASA-CR-161230] N79-27656
WEIGHT REDUCTION
User manuals for three computer programs for analysis of composite materials [LOPT, SOPT, SOC]
[FFA-TN-HU-2054] N79-27252
WEIGHTLESSNESS
Possibilities of preventing adverse reactions in simulating the acute period of adaptation to weightlessness
N79-27825
WELD STRENGTH
Fracture toughness of fabrication welds investigated by metallographic methods
[CONF-780732-5] N79-27295
WELLS
Analysis of factors affecting water level recovery data
N79-27621
WEST VIRGINIA
Tectonic motion site survey of the National Radio Astronomy Observatory, Green Bank, West Virginia
[NASA-TM-79691] N79-27748
WHEAT
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629
WHITE NOISE
Estimation of the parameters of an autoregressive process in the presence of additive white noise
[AD-A068749] N79-27363
WIDEBAND COMMUNICATION
Multiple band circularly polarized antenna
[NASA-CASE-MSC-18334-1] N79-27348
WIND [METEOROLOGY]
Minimum altitude-loss soaring in a specified vertical wind distribution
N79-27071
Earth winds, flow quality, and the minimum-protection inlet treatment for the NASA Ames 80- by 120-foot wind tunnel nonreturn circuit
[NASA-TM-78600] N79-27186
Development and validation of a three-dimensional wind model for air quality analysis in complex terrain
N79-27551
Diurnal rainfall variability in northeast Brazil
[INPE-1487-RPE/033] N79-27774
The 19702A GSRS missle number 10, round number, B-1, 6 February 1979
[AD-A067676] N79-27777
The 12831D Lance missile number 3306, round number 323, ESL
[AD-A067687] N79-27779
Summary of Meteorological Observations, Surface [SMOS] Corpus Christi, Texas
[AD-A067679] N79-27781
Comparison of model and observed nearshore circulation
[ANL/EES-CP/22] N79-27808
WIND DIRECTION
Bivane studies of air flow over irregular terrain
N79-27552
Influence of the turbulence typing scheme upon the yearly average concentrations by means of a bi-Gaussian model
N79-27555
Use of wind fluctuation statistics to estimate dispersion near roadways
N79-27558
Receptor grid selection in model evaluation studies to compensate for uncertainty in wind direction specification
N79-27592
On the diurnal variation of wind in Finland
[TR-17] N79-27769
Wind trajectory models
[KNMI-WR-78-6] N79-27787
WIND EFFECTS
Wind mixing in lakes
N79-27625
WIND MEASUREMENT
Objective wind field pattern characterization
N79-27570
Compilation and analysis of data sets for the evaluation of regional sulfate models
N79-27579
WIND PROFILES
Wind field and trajectory models for tornado-propelled objects
[NASA-CR-158775] N79-27091
Dispersion parameters determined from measurements of wind fluctuations [sigma sub theta], temperature and wind profiles
N79-27566
Mass-consistent wind field modeling: Finite difference vis-a-vis finite element
N79-27571
Relation of Richardson number to the curvature of the wind profile
[INPR-1486-RPE/032] N79-27775
WIND TUNNEL APPARATUS
Wind tunnel measurements of dynamic derivatives in the German Federal Republic
[IFD-5-78] N79-27107
WIND TUNNEL DRIVES
A long stroke isentropic free piston hypersonic wind tunnel
[AASU-334] N79-27190
WIND TUNNEL TESTS
Wind tunnel tests of four flexible wing ultralight gliders
N79-27084
The development of methods for predicting and measuring distribution patterns of aerial sprays
[NASA-CR-158787] N79-27092
An exploratory investigation of the effect of a plastic coating on the profile drag of a practical-metal-construction sailplane airfoil
[NASA-TM-80092] N79-27098
Wind tunnel measurements of dynamic derivatives in the German Federal Republic
[IFD-5-78] N79-27107
Investigations of interference effects in a wind tunnel caused by a model support strut on a reflection plane mounted half model
[FFA-TN-AU-1335:2] N79-27109
Small turbine engine integration in aircraft installations
N79-27170
Study in a straight cascade wind tunnel of aeroelastic instabilities in compressors
N79-27178
Aeropropulsion systems test facility rake calibration test in tunnel A
[AD-A068975] N79-27189
Analysis of wind tunnel test results of fluidic generator for high-altitude rocket
[AD-A069172] N79-27219
WIND TUNNELS
Influence of optimized leading-edge deflection and geometric anhedral on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- langley 7 by 10 foot tunnel
[NASA-TM-80083] N79-27095
WIND VELOCITY
Bivane studies of air flow over irregular terrain
N79-27552
A model for the microwave emissivity of the ocean's surface as a function of wind speed
[NASA-TM-80278] N79-27640
Behavior of the thermal skin of cooling pond waters subjected to moderate wind speeds
[CONF-781213-3] N79-27722
On the diurnal variation of wind in Finland
[TR-17] N79-27769
Wind and wave climate in the Netherlands sector of the North Sea between 53 deg and 54 deg north latitude
[KNMI-WR-78-9] N79-27791
Surface wind analysis overland in the Netherlands, based on an optimum interpolation method
[KNMI-WR-78-17] N79-27797
WINDOWS [APERTURES]
Aircraft transparency failure and logistical cost analysis. Volume 1: Program summary
[AD-A068719] N79-27131
Description of the possibilities for energy savings during the design and construction of apertures in buildings [cross-section report]
[BMFT-FB-T-78-15] N79-27345
WINDPOWER UTILIZATION
A large scale wind energy program for the state of California
N79-27648
Analysis of the potential of wind energy conversion systems
[SAND-78-2099C] N79-27668
WINDPOWERED GENERATORS
Analysis of wind tunnel test results of fluidic generator for high-altitude rocket
[AD-A069172] N79-27219
Aerodynamic performance of the 17-metre-diameter Darrieus wind turbine
[SAND-78-1737] N79-27670

WINDSHIELDS
Aircraft transparency failure and logistical cost analysis. Volume 1: Program summary
[AD-A068719] N79-27131
WING FLOW METHOD TESTS
Computation of potential flow around bodies
N79-27456
WINGS
A general method for the layout of ailerons and elevators of gliders and motorplanes
N79-27076
Experimental investigation into the feasibility of an extruded wing
N79-27077
Improvement of hang glider performance by use of ultralight elastic wing
N79-27082
Ultrasonic inspection of wing spar attachment joints and lugs in viscount aircraft
[REPT-7610.910] N79-27523
WINTER
Large Area Crop Inventory Experiment (LACIE). An early estimate of small grains acreage --- Indiana, Kansas, Idaho, Texas, and Washington
[E79-10212] N79-27629
Underground storage of natural gas by interstate pipeline companies for 1976 and winter 1976 - 1977
[DOE/EIA-0151] N79-27684
Average winter temperatures at De Bilt (the Netherlands): 1634 - 1977
[KNMI-V-305] N79-27796
WOOD
Material and energy balances in the production of ethanol from wood --- conferences
[CONF-7806139-1] N79-27338
WORKING FLUIDS
Thermal performance evaluation of the Semco (liquid) solar collector
[NASA-CR-161230] N79-27656
WRECKAGE
Amoco Cadiz: Preliminary observations of the oil spill impact on the marine environment --- conference proceedings, Brest, 7 Jun. 1978
[CNEXO-6-1978] N79-27726

X

X RAY FLUORESCENCE
X-ray excited optical luminescence of poly-nuclear aromatic hydrocarbons
N79-27266
X RAY SOURCES
The hadron spectrum at ground level, part 1. The stability of the period of cygnus x-3, part 2
N79-28072
A search for X-ray emission from rich clusters, extended halos around clusters, and superclusters
[NASA-TM-80294] N79-28092
X RAY SPECTRA
X-ray emission from CH2 laser-produced plasmas at 10 to the 16th power w/cm-2
[AD-A067517] N79-27998
High energy X-ray and radio studies of Scorpius X-1
[NASA-TM-80298] N79-28077
Pulse phase spectroscopy of Hercules X-1
[NASA-TM-80299] N79-28078
X RAY SPECTROSCOPY
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
N79-27264
Application of curve-fitting to X-ray photoelectron spectroscopy and cyclic voltammetry
N79-27265
Topics in astrophysical X-ray and gamma ray spectroscopy
N79-28067
Pulse phase spectroscopy of Hercules X-1
[NASA-TM-80299] N79-28078
X RAY TELESCOPES
Image quality of a Wolter-1 type X-ray telescope under particular contrast reduction conditions due to diffuse reflection
[MPI-PAE/EXTRATERR-145] N79-27984
XENON
Analysis of direct nuclear pumped noble gas lasers
N79-27487

Y

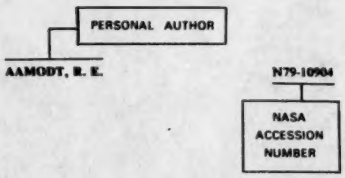
YIELD STRENGTH
On the calculation of yield strength for various assemblies
[CETIM-1-1G-06-0] N79-27541
YTTRIUM ALLOYS
Mossbauer study of Y[Fe(0.022]Co[0.978]2] from 259K to 0.18K using a stochastic model of magnetic ordering
N79-28014

Z

ZINC COMPOUNDS
Auger spectroscopy analysis of lubrication with zinc dialkyldithiophosphate of several metal combinations in sliding contact
[NASA-TP-1489] N79-27308
ZINC OXIDES
Theoretical and experimental analysis of alkaline zinc batteries
[AD-A067514] N79-27666
ZINC SELENIDES
Laser modulation of optical absorption in ZnSe
[NASA-CR-158789] N79-27976

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



Listings in this Index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

AAKERSTEN, S. I. N79-27646
AARNES, M. N N79-27167
ABRAHAMSSON, L. N79-27474
ABRAMS, S. G. N79-27842
ACKLEY, S. F. N79-27785
ACUNA, M. H. N79-28104
ADAMCZYK, J. J. N79-27181
ADAMSON, M. J. N79-27243
AHLUWALIA, R. K. N79-28000
AHRENS, F. W. N79-27693
AHUJA, K. K. N79-27933
AKRITAS, A. G. N79-27890
ALBERNHE, F. N79-28076
ALDERSON, R. G. N79-27156
ALEANO, J. N79-27632
ALEXANDER, J. H. N79-27397
ALEXANDER, J. K. N79-28103
ALLENBY, R. J. N79-27748
ALLENDER, J. H. N79-27808
ALLENOU, J. P. N79-27810
ALMEIDA, W. A. N79-27325
ALTMAN, J. L. N79-27562
AMALDI, E. N79-27762
AMARAL, P. F. S. N79-27874
AMSDEN, A. A. N79-27452
N79-27454
ANDERSON, A. D. N79-28047
ANDERSON, E. L. N79-27273
ANDERSON, J. C. N79-27120
ANDERSON, J. D., JR. N79-27489
ANDERSON, J. M. N79-27206
N79-27207
ANDERSON, R. A. N79-27839
ANDERSON, S. B. N79-27182
ANDERSON, T. F. N79-28036
ANDERTON, D. A. N79-27089
ANDRESEN, P. N79-28005
ANDREWS, R. W. N79-27803
ANTHES, R. A. N79-27591
ANTHONY, P. J. N79-27294
ANTONOVA, A. E. N79-27763
ARCONE, S. A. N79-27352
ARIAS, A. N79-27309
ARNBORG, S. N79-27913
ARNOLD, S. M. N79-28069
ARNTSING, R. N79-27970
ARNZEN, S. N79-27122
ASYAMOLOV, B. F. N79-27825
ATHANASOPOULOS, J. N79-27889
ATKINSON, R. N79-27630
N79-27631
ATSTUPENAS, V. V. N79-27501
AUSTIN, F. D. N79-27867
AUSTIN, J. A., JR. N79-27768
AUSTIN, T. C. N79-27605
AUVERMANN, H. J. N79-27750
AVANZINO, S. C. N79-27264

B

BABB, C. D. N79-27099
BABUSHIKOVA, D. N79-27822
BABUSKA, I. N79-27903
BACCI, P. N79-27565
BACHELET, E. N79-27147
BAER, L. H. N79-27188
BAILEY, G. L. N79-27167
BAILLARGEON, D. J. N79-27260
BAJURA, R. A. N79-27475
BAKER, A. J. N79-27463
BAKER, E. G. N79-27327
BAKER, L. N79-27888
BAKER, L., JR. N79-27469
BAKHSHIYAN, B. T. N79-27197
BALLATO, A. N79-27409
BALMINO, G. N79-27223
BARASHKOV, V. A. N79-27834
BARAZILAI, Y. N79-27924
BARBER, J. N79-27293
BARD, W. D. N79-27126
BARER, A. S. N79-27826
BARISH, J. N79-27713
BARKATS N79-27708
BARNA, G. J. N79-27665
BARNES, R. G. N79-28029
BARR, D. R. N79-27132
BARRACLOUGH, D. R. N79-27761
BARRERE, J. N79-27174
BARRETT, C. F. N79-27547
BARROS, M. S. S. N79-27641
BARTLETT, R. N79-27208
BASIL, V. R. N79-27880
BATCHELDER, R. B. N79-27579
BATISTA, P. P. N79-27745
BATY, D. L. N79-27136
BAUER, J. N79-28040
BAUMEISTER, K. J. N79-27461
BAVASSANO, B. N79-28111
BAXTER, D. K. N79-27887
BAXTER, L., II N79-27936
BAXTER, T. N79-27773
BAYLOR, V. B. N79-27535
BEAUJEAN, J. M. N79-27652
BEAUMONT, P. W. R. N79-27247
BECKERS, P. N79-27155
BECKMAN, L. N79-28044
BEEKER, G. G. N79-27118
BEHANNON, K. W. N79-28104
BEJAR, I. I. N79-27878
BELEW, P. W. N79-27484
BELITSKAYA, R. A. N79-27823
BELLER, M. N79-27694
BEN-DOR, G. N79-27187
BEN-TAL, A. N79-27924
BENAVIDES, A. N79-27406
BENAZET, D. N79-27316
BENJAMIN, S. F. N79-27548
N79-27586
N79-27096
BENNETT, R. M. N79-27666
BENNION, D. N. N79-27585
BERGER, A. L. N79-27693
BERGHMANS, J. A. N79-27572
BERKOWICZ, R. N79-28056
BERLINER, D. N79-27691
BERLINSKI, P. N79-28098
BERTAU, G. N79-27293
BERTKE, R. S. N79-27689
BERWIG, D. N79-27138
BETZINA, M. D. N79-27714
BEYAD, M. H. N79-28028
BEYER, R. A. N79-27194
BHAVSAR, P. D. N79-27576
BHUMRALKAR, C. M. N79-28031
BICHON, G. N79-28083
BIDDIS, E. T. N79-27332
BIENSTOCK, D. N79-27712
BIERHALS, R. N79-27376
BIGGI, V. N79-27914
BIJLSMA, S. J. N79-27469
BINGLE, J. D. N79-27373
BINIAS, G. N79-27561
BINKOWSKI, F. S. N79-28100
BIOLSI, L., JR. N79-27741
BIRD, D. K. N79-27968
BISCHOFF, K. N79-27168
BISSINGER, N. C. N79-27353
BITTENCOURT, J. A. N79-27997
N79-27395
BLACK, J. M. N79-27426
BLAHA, R.
BLAMONT, G. N79-28098
BLAND, S. R. N79-27096
BLECH, J. J. N79-27158
BLEEKRODE, A. L. N79-27459
BLINCO, R. K. N79-27170
BLITZ, L. N79-28068
BOBB, L. C. N79-27497
BOBELDIJK, C. N79-28006
BOCK, P. N79-27632
BOCLET, D. N79-28076
BODVARSSON, G. N79-27676
BOEHM, H. N79-27729
BOGARD, D. C. N79-28102
BOHLMANN, E. G. N79-27691
BOISCHOT, A. N79-28103
BOLDMAN, D. N79-27930
BOLDT, E. A. N79-28092
BOLLETER, U. N79-27165
BONDESON, A. N79-28004
BONETTI, R. R. N79-27402
BONINO, G. N79-27565
BOOKER, H. G. N79-27359
BOOKER, M. K. N79-27296
N79-27535
BOOKER, R. A. N79-28088
BORELL, C. N79-27927
BOSSA, F. N79-27565
BOTMAN, M. N79-27170
BOTTA, E. F. F. N79-27456
BOUNTIS, A. C. N79-28034
BOUWS, E. N79-27791
BOWEN, J. N79-27730
BOWYER, J. M. N79-27660
BOYCE, J. N79-28066
BRADLEY, P. A. N79-27386
N79-27392
BRAENNSTROEM, B. N79-27109
BRAGG, M. B. N79-27092
BRAINARD, W. A. N79-27306
BRANDON, E. W. N79-27584
BRANDQVIST, L. N79-27909
BRAUN, R. A. N79-27590
BRAY, K. N. C. N79-27490
BRAZEE, R. J. N79-27767
BREAULT, R. P. N79-27973
BREBNER, G. G. N79-27202
N79-27203
N79-27204
N79-27205
BREITBACH, E. J. N79-27078
BRENNER, P. N79-27911
BRIGGS, G. A. N79-27563
BROADBENT, S. N79-27699
BROWN, J. S. N79-28050
BROWN, R. W. N79-28090
N79-28091
BROWN, S. D. N79-27520
BROWN, S. S. N79-27131
BRUCE, T. W. N79-27145
N79-27146
BRUMLEVE, T. R. N79-27272
BRUNET, H. N79-27492
BRUNSON, J. W. N79-27865
BUCCIARELLI, L. L. N79-27677
BUCHWALD, V. F. N79-28099
BUCKLEY, D. H. N79-27308
BUECKMANN, H. J. N79-27370
BUEHLMANN, E. N79-27165
BUNKER, B. C. N79-27262
BURBY, R. J. N79-27112
BURGESS, R. J. N79-27111
BURGMEIER, J. N79-27384
BURLAGA, L. F. N79-28104
BURNS, R. K. N79-27665
BUSHELLE, W. R. N79-27357
BUSSARD, R. W. N79-28067
N79-28078
BUSSOLINO, L. N79-27238
BUTLER, T. D. N79-27453

C

CAESAR, B. N79-27240
CALDWELL, R. N79-27659
CALLAS, L. N79-27630
N79-27631
CALM, J. M. N79-27696
N79-28063
CALVY N79-27708
CANNEMEIJER, F. N79-27787
CANONICO, D. A. N79-27295
CAREY, D. L. N79-27604
CARLQVIST, S. N79-27505
CARMON, M. N79-27533
CARO, C. G. N79-27848
N79-27849
CARPIO, R. A. N79-27280
CARR, T. B. N79-28103
CARROLL, D. P. N79-27259
CARROLL, W. F. N79-27244
CARTY, C. S. N79-27811
CASCONE, M. J. N79-27404
CASSIDY, J. J., III N79-27397
N79-27398
CASTERA, J. P. N79-27982
CATHALA N79-27708
CATS, G. J. N79-27728
N79-27797
CAUVARD, P. N79-27368
CAVES, C. M. N79-27743
CHALIER, J. N79-27541
CHAMBERLIN, R. N79-27141
CHAN, K. C. N79-27737
CHANG, A. T. C. N79-27635
CHANG, L. S. N79-27081
CHANGNON, S. A. N79-27800
CHAPLART, J. N79-28031
CHAPMAN, M. E. D. N79-27804
CHAPMAN, R. A. N79-27610
CHARNES, A. N79-27882
N79-27924
N79-28046
CHARPENTIER, J. P. N79-27652
CHASE, R. L. N79-27192
CHAUDONNERET, M. N79-27157
CHAWLA, S. K. N79-27528
CHECCACCI, P. F. N79-27986
CHEN, I. N79-27071
CHEN, K. N79-27996
CHEN, T. P. N79-27667
CHEN, Y. N. N79-27514
CHENOWETH, G. E. N79-27616
CHERNYAKOV, I. N. N79-27826
N79-27827
CHESTER, A. N. N79-27493
CHESTUKHIN, V. V. N79-27831
CHEUNG, F. B. N79-27469
CHIARINI, F. N79-27124
CHILSHOLM, D. N79-27473
CHING, J. K. S. N79-27561
CHITTINENI, C. B. N79-27875
N79-27916
N79-27917
CHO, Y. C. N79-27931
CHOPRA, P. S. N79-27674
CHRISTIAN, J. E. N79-27704
CHRISTIE, W. H. N79-27250
CHRISTMAS, S. N79-28056
CHUI, K. S. N79-27291
CHUNG, K. T. N79-27310
CLAISSE, J. N79-28076
CLARK, L. R. N79-27931
CLARK, R. C. N79-27496
CLARKE, F. D. N79-27220
CLARKE, G. A. N79-27520
CLARKE, J. F. N79-27561
CLAXTON, D. N79-27406
CLAYTON, D. C. N79-28083
CLINE, P. B. N79-27447
CLINE, T. L. N79-28115
COE, M. J. N79-28077
COE, P. L., JR. N79-27095
COHEN, S. N79-27403
COLEMAN, E. N79-27145
COLLATZ, L. N79-27457
COLLINGE, K. S. N79-27149
COLLINS, B. P. N79-27811
COLLINS, P. S. N79-28066
COLOMBANT, D. G. N79-27998
COLPIN, J. N79-27177
COMBER, M. G. N79-27411
CONAN, G. N79-27726
CONGEDUTI, F. N79-27381
CONNER, D. W. N79-27086
CONNER, H. L., JR. N79-27137
CONRAD, E. W. N79-27140
COOK, G. N79-27929
COOK, J. L. N79-27453
COOK, S. K. N79-27811
COOK, T. S. N79-27520
COONROD, J. W. N79-27995
COOPER, P. D. N79-27415
COOPER, W. W. N79-28046
COOVER, S. R. N79-27715
COPELAND, R. J. N79-27705
COPPOLA, J. A. N79-27251
CORAZZARI, F. N79-27587
CORSON, M. R. N79-28014
COSTELLO, D. N79-28056
COURVOISIER, H. W. N79-27771
COX, R. N. N79-27851
CRABBS, R. F., JR. N79-27482
CRANNELL, C. J. N79-28077
CRAWFORD, D. W. N79-27836
CREMIN, J. D. N79-27672
N79-27677
CRESPI, I. N79-27339
CRETCHER, C. K. N79-27687
CRISP, C. N79-27816
CRISP, N. N79-27816
CROCE, P. N79-27979
N79-27980
CROSBY, W. A. N79-27189
CROUCH, K. E. N79-27401
CROUSE, R. S. N79-27295
CRUSIUS, M. N79-27423
CRUTCHFIELD, C. D., JR. N79-27477
CUKOR, P. M. N79-27610
CUMMINS, S. E. N79-27957
CUNNAN, W. S. N79-27143
CUNNINGHAM, F. N79-27816
CUNNINGHAM, J. W. N79-27520
CURTISS, H. C., JR. N79-27125
CZODRUCH, J. N79-27103

D

DACOSTA, J. M. N79-28076
DAEUBLER, H. G. N79-27104
N79-27105
DAGENHART, G. S. N79-27305
DAINES, N. H. N79-27602
DAINO, B. N79-27374
N79-27986
DAMATO, R. N79-27799
DANIELE, C. J. N79-27663
DASILVA, W. C. C. N79-27749
DAURIA, L. N79-27369
DAVIDSON, G. A. N79-27581
DAVIES, M. J. E. N79-27552
DAVIES, R. W. N79-27945
DAVIS, H. S. N79-27658
DEADWYLER, R. N79-27517
DEAN, P. D. N79-27933
DECORPO, J. J. N79-27496
DEEBA, M. N79-27258
DEESE, J. E. N79-27487
DEGARCIA, H. N79-27129
DEGREER, L. E. N79-27970
DEGTYAREV, V. A. N79-27819
DEHON, R. A. N79-28101
DEJONGE, J. B. N79-27135
DELANEY, A. J. N79-27352
DELUCIA, R. A. N79-27166
DELUCIEN, A. G. N79-27127
DENNIS, B. R. N79-28077
DENZINGER, H. N79-27721
DEOLIVEIRA, A. M. N79-27896
DEOLIVEIRA, M. D. L. N. N79-27641
DEOLIVEIRASILVA, O. N79-27920
DERGARABEDIAN, P. N79-27091
DERRICK, A. N79-28083
DESAI, N. N79-27304
DESAI, U. D. N79-28115
DESCH, M. D. N79-28103
DESETA, D. N79-27912
DETERMANN, O. N79-27107
DEUTSCHER, S. B. N79-27669
DEZALY, F. N79-28031
DICKEL, J. R. N79-28075
DICLAUDIO, B. N79-27953
DIECKHONER, J. E. N79-27958
DINE, M. N79-28035
DINI, D. N79-27159
DIPPOLITO, D. A. N79-28006
DITMARS, J. D. N79-27808
DIVITA, E. N79-27193
DJURFORS, S. G. N79-27581
DOBROWOLNY, M. N79-28111
DODDS, R. H., JR. N79-27527
DODGE, M. J. N79-27990
DODGE, P. O. N79-27118
DOERNBERG, A. N79-27694
DOLAN, F. X. N79-27478
DOLAN, J. F. N79-28077
DOLEZALEK, H. N79-27792
DOLLOFF, J. W. N79-27667
DONE, W. J. N79-27363
DONINA, Z. A. N79-27829
DONOVAN, R. L. N79-27699
DORIATH, A. N79-28031
DOSS, E. N79-28000
DOZOUVILLE, L. N79-27726
DRAKE, R. P. N79-27994
DRAKE, S. K. N79-27881
DRAVSKIKH, A. F. N79-28073
DRESSENDORFER, P. V. N79-28023
DUBININ, E. M. N79-28105
DUBOIS, B. M. N79-27313
DUBOS, J. N79-27369
DUKE, M. B. N79-28102
DUNCAN, J. M. N79-27755
DUNNING, J. D. N79-28009
DUNNING, T. E. N79-27167
DUPNICK, E. G. N79-28045
DUROUCHOX, P. N79-28076
DUTRA, S. L. G. N79-28076

E

EAST, R. A. N79-27190
EBERL, J. N79-27165
ECKBRETH, A. C. N79-27468
ECKERT, W. T. N79-27186
EDELSON, E. N79-27658
EDELSTEIN, M. W. N79-27546
EIKEMEIER, K. D. N79-27074
EKMANN, J. M. N79-27332
EL-BAZ, F. N79-27626
EL-DERINI, Z. N79-28000
ELGIN, J. H., JR. N79-27638
ELIASBERG, P. E. N79-27197
ELIASH, B. M. N79-27666
ENGELDER, P. R. N79-27624
ENGLISH, T. N79-27193
ENGSTROEM, J. A. N79-27970
EPPERLY, W. R. N79-27618
ERICKSON, J. B. N79-27185
ESLINGER, D. R. N79-27303
ETIENNE, P. N79-28031
EVANS, A. G. N79-27937
EVANS, D. W. N79-27188
EVANS, K. N79-28083
EVANS, W. H. N79-28027
EVERETT, C. N79-27337
N79-28059
EWING, J. N79-27654

F

FABER, K. T. N79-27251
FABRI, J. N79-27430
FAGNONI N79-27708
FAHRNER, W. N79-27426
FALARSKI, M. D. N79-27138
FALCIASECCA, G. N79-27124
FALCONER, P. D. N79-27716
FALICOV, L. M. N79-27283
FANAKI, F. H. N79-27560
FARMER, R. N79-27337
FARR, L. R. N79-27475
FAULCONNIER, P. N79-27414
FEDORS, R. F. N79-27321
FELDMAN, A. N79-27990
FELDSTEIN, C. N79-27836
FELLER, D. F. N79-27941
FELLHAUER, C. N79-28056
FELTHOUSE, T. R. N79-27263
FENDELL, F. E. N79-27091
FENTON, H. A. N79-27672
N79-27677
FERGUSON, K. R. N79-27475
FERRANTE, D. N79-27587
FERRARI, E. N79-27969
FERRARIS, G. N79-27150
FERREIRA, L. D. D. N79-27749
FERREIRA, N. J. N79-27776
FERREIRA, P. A. N79-27524
FEURER, B. N79-27507
FICKLE, R. K. N79-28072
FIELDS, S. A. N79-27500
FILIPENKOV, S. N. N79-27826
FILIPPONI, P. N79-27926
FINE, J. E. N79-27219
FINKEL, R. N79-27883
FINKELSHTEYN, A. M. N79-28073
FINKELSTEIN, T. N79-27504
FIORY, A. T. N79-27946
FISCHELL, R. E. N79-27224
FLEETER, S. N79-27180
FLEGAL, A. R., JR. N79-27805
FLEMING, D. K. N79-27342
FLETCHER, G. Y. N79-27893
FLORINI, J. R. N79-27867
FONTANA, M. N79-27587
FORMAN, S. E. N79-27671
FORSYTHE, R. E. N79-27350
FOSTER, J. M. N79-27098
FOUEILLASSAR, J. M. N79-27163
FOWLKES, J. C. N79-27118
FOX, J. R. N79-27520
FRABEL, M. N79-28076
FRAMPON, P. H. N79-27905
FRANKEL, R. S. N79-27185
FRANKS, A. N79-28083
FRANTZEN, A. J. N79-27727
FRANZEN, W. O. N79-27807
FREEMAN, N. C. N79-27439
FREES, L. C. N79-27257
FREIDBERG, J. P. N79-28006

FRENCH, J. B. N79-27959
FREY, W. P. N79-27669
FRIBERG, J. N79-27910
FRICKS, D. H. N79-28062
FRIDMAN, P. A. N79-28073
FRIEDLAND, S. N79-27925
FROST, K. J. N79-28077
FRYBURG, G. C. N79-27279
FUJITA, T. N79-27660
FUNG, L. W. N79-27864

G

GABRIEL, C. N79-27799
GADDO, P. P. N79-27586
N79-27587
GAGGINI, B. N79-27630
N79-27631
GAGLIONE, P. N79-27565
GAIDOSCH, H. N79-27212
GALE, B. N79-28083
GALEEV, A. A. N79-28007
GAMBLE, T. D. N79-27742
GARBO, S. P. N79-27518
GAUDEN, W. H. N79-27934
GAYEVSKAYA, M. S. N79-27823
GAZENKO, O. G. N79-27819
GEAR, C. W. N79-27907
GEBEL, R. N79-27421
GEIB, H. N79-27564
GEISLER, R. N79-27759
GEORGE, R. T., JR. N79-27396
GEORGE, T. F. N79-27944
GERASOULIS, A. N79-27529
GERVASI, M. N79-28055
GEYER, H. N79-28000
GHIZONI, C. C. N79-28026
GHOSH, S. N79-27666
GHOSH, V. J. N79-28022
GIACAGLIA, G. E. O. N79-27895
GIACOMELLI, L. N79-27587
GIARDINI-GUIDONI, A. N79-27498
GIBSON, E. K. N79-28102
GIBSON, S. F. N79-27815
GIER, J. N79-27384
GIFFORD, F. A. N79-27553
GILMER, R. W. N79-27685
GINOCCHIO, J. N. N79-27947
GINOSAR, M. N79-27648
GIRTON, L. D. N79-27234
GITELZON, I. I. N79-27834
GIUDICELLI N79-27708
GIVEN, J. W. N79-27807
GLAISTER, D. N79-27844
GLAISTER, D. H. N79-27856
N79-27857
N79-27858
GLASSER, K. S. N79-27902
GLAZKOVA, V. A. N79-27827
GLOTZ, G. N79-27104
N79-27106
GODDEN, D. A. N79-27575
GODOWITCH, J. M. N79-27561
GOEDBLOED, J. P. N79-28006
GOEL, A. L. N79-27877
GOLAN, M. N79-28081
GOLDBERG, I. B. N79-27868
GOLDSTEIN, D. B. N79-27651
N79-27683
GOLDSTEIN, M. E. N79-27181
GOLDSTEIN, M. L. N79-28114
GOLIS, M. J. N79-27520
GOLOVKIN, L. G. N79-27826
GOLUB, M. A. N79-27241
GONZALEZ-ALARCON, W. D. N79-28089
GONZALEZ, A. L. C. N79-28089
GONZALEZ, J. N79-27228
GOODWIN, P. E. N79-27837
GORDON, B. M. N79-27271
GORMAN, R. N79-27675
GORRELL, W. T. N79-27143
GOWADIA, N. S. N79-27126
GRAF, W. N79-28077
GRAFAREND, E. W. N79-27121
GRAHAM, J. M., JR. N79-27185
GRAHAM, L. N79-27261
GRAHAM, N. E. N79-27545
GRAHAM, S. N79-27233
GRANATH, S. N79-27794
GRANDOLFO, M. N79-27855
GRANDOULIER, D. N79-27154
GRANNAN, D. M. N79-27956
GRANT, R. W. N79-27698
GRAS, J. M. N79-27284
N79-27413
GRASSO, A. N79-27158
GRAY, W. H. N79-28001
GRAZIANI, D. N79-27124
GREEN, D. L. N79-27127
GREENE, J. B. N79-27129
GREENSTEIN, D. N79-27704
GREENWALD, M. J. N79-27993
GREGORY, P. C. N79-27229
N79-27231
GRENON, M. N79-27628
GREOGORIOU, G. N79-27213
GRESHO, P. M. N79-27571
GRIBIK, P. R. N79-27882
GRIER, N. T. N79-27235
GRIFFIOEN, A. C. N79-28006
GRIFFITH, E. D. N79-27603
GRIGORYEV, A. I. N79-27819
GROSSWALD, E. N79-27898
GUALDI, R. N79-27595
GUARISO, G. N79-27627
GUERBER, H. P. N79-27118
GUEST, C. J. N79-27100
GUILLO, J. L. N79-27152
GULBINAS, E. N79-27338
GULKIS, S. N79-28103
GUPTA, A. N79-27244
GUPTA, S. S. N79-27918
GUSEVA, Y. V. N79-27820
GUST, G. R. N79-27256
GUSTAFSON, T. K. N79-27495
GUSTAFSSON, L. E. N79-27646
GUTFREUND, P. D. N79-27592

H

HACK, W. N79-27285
HACKLEMAN, D. E. N79-27270
HAEGGLUND, B. N79-27474
HAFER, X. N79-27107
HAFEZ, M. M. N79-27101
HAGLER, H. N79-27704
HAHN, H. T. N79-27248
HAIBACH, E. N79-27919
HAJDUK, J. C. J. N79-27255
HALL, D. J. N79-27290
N79-27547
HALL, G. T. N79-27360
HALL, R. M. N79-27094
HALLER, E. E. N79-27283
N79-28030
HALLGREN, B. N79-27710
HALLIWELL, D. G. N79-27175
HAMBURG, G. W. N79-27516
HAMILTON, K. G. N79-27584
HAMMOND, M. N79-28083
HANSON, P. W. N79-27070
HARGIS, D. R. N79-27621
HARLOW, F. H. N79-27451
N79-27454
HARMAN, W. H. N79-27119
HARRAR, J. E. N79-27669
HARRINGTON, R. F. N79-27928
HARRIS, R. W. N79-27838
HARRISON, M. N79-27876
HARRISON, T. D. N79-27680
HARRISON, W. N79-27808
HARTEMANN, P. N79-27368
HARTMANN, M. J. N79-27181
HARTWICK, R. A. N79-27269
HARVEY, M. C. N79-27718
HARVEY, R. N79-27407
HATHAWAY, W. M. N79-27600
HAVLENA, J. J. N79-27548
HAYASHI, M. N79-27923
HAYES, J. V. N79-27557
HAYES, S. R. N79-27589
HEATH, D. E. N79-28061
HECKMAN, R. A. N79-27962
HEDGEPETH, J. N79-27655
HEDMAN, S. N79-27110
HEDON, D. N79-27174
HEINLEIN, W. N79-27384
HEINO, R. N79-27769
HELLINGMAN, P. N79-28006
HELNKEN, H. N79-28115
HELVEY, R. A. N79-27784
HEMP, W. S. N79-27542
HENDRICKS, R. C. N79-27460
HENRION, J. N79-27989
HENRY, R. N79-27150
HEPNER, G. N79-27982
HERMELEE, A. N79-27694
HERSENER, J. N79-27424
HERTZ, W. N79-27422
HESSEL, M. N79-27108
HEWITT, S. J. N79-27415
HIDY, G. M. N79-27575
HILDER, M. H. N79-27470
HILLER, M. H. N79-27076
HILLGER, D. W. N79-27770
HILPERT, K. N79-27425
HIRATA, A. A. N79-27578
HIRSCHBERG, M. H. N79-27179
HIRT, C. W. N79-27453
HIXON, B. R. N79-27200
HO, H. N. N79-27220
HOBBS, B. F. N79-27695
HODGES, J. N79-27630
N79-27631
HOEKZEMA, J. A. N79-28006
HOFF, L. E. N79-27359
HOFFMAN, K. C. N79-27694
HOFFMAN, R. M. N79-27476
HOFMANN, D. J. N79-27753
HOFMANN, R. N79-27949
HOFMANN, W. N79-27230
HOLDSWORTH, T. N79-27962
HOLLANDA, R. N79-27480
HOLMES, M. N79-27160
HOLMES, R. N79-27164
HOLSLAG, A. A. M. N79-27790
HOLT, W. H. N79-27312
HOLZAPFEL, W. N79-27499
HOOGENDOORN, R. J. N79-27914
HOOPER, G. N79-27340
HOOTS, L. C. N79-27357
HOPKINS, L. G. T. N79-27415
HOPKINSON, R. F. N79-27677
HORGAN, F. N79-27376
HORLOCK, J. H. N79-27431
N79-27432
HORNUNG, P. A. N79-28029
HOROWITZ, D. N79-27990
HORSTMANN, C. N79-27711
HOSFORD, J. E. N79-27185
HOUGHTBY, W. E. N79-27702
HOVIND, E. L. N79-27545
N79-27546
HOWARD, J. N79-28083
[illegible] C. N79-27242
HUBA, J. D. N79-27754
HUDGENS, J. W. N79-27496
HUESCHELRATH, G. N79-27372
HUFFINGTON, N. J., JR. N79-27239
HUFFMAN, J. K. N79-27095
HUIE, H. H. N79-27662
HUMES, B. N79-27164
HUMMEL, H. H. N79-27971
HUNT, J. C. R. N79-27559
HUNT, W. T. N79-27358
HUNTER, E. L. N79-27867
HURDIS, H. N79-27172
HUSSEY, C. L. N79-27280
HUTCHINSON, R. O. N79-27752
HUTH, G. K. N79-27349
HUTTON, L. K. N79-27748

I

ILINA-KAKUYEVA, Y. I. N79-27821
INDOVINA, P. L. N79-27854
INOUYE, R. N79-27594
IOANNOU, I. N79-27465
ISAACSON, A. D. N79-27254
IVANOV, A. A. N79-27824

J

JACKSON, F. C. N79-27636
JACKSON, W. L. N79-27704
JACQUES, A. N79-27369
JAFFE, N. A. N79-27440
JAKOBSSON, S. N79-27970
JAMES, K. A. N79-27975
JANSSON, B. N79-27378
JANTZEN, R. T. N79-28086
JANZON, K. N79-27474
JARDIM, J. O. D. N79-28087
JASIONOWSKI, W. J. N79-27328
JAYROE, R. N79-27630
N79-27631
JEFFERS, E. L. N79-28062
JENKINS, J. M. N79-27088
JENKO, S. O. N79-27085
JILEX, J. H. N79-27302
JOHNS, A. L. N79-27093
JOHNSON, D. G. N79-27328
JOHNSON, E. L. N79-27879
JOHNSON, N. L. N79-27898
JOHNSON, W. B. N79-27576
JOHNSTON, R. L. N79-27812
JONES, H. G. M. N79-27601
JONES, J. N79-27816
JONES, K. N79-28059
JONES, L. K. N79-27904
JONES, N. N79-27534
JOOS, D. N79-27230
JOSSE N79-27708
JOUBERT, J. L. N79-27316
JOURDAN N79-27708
JUNG, R. N79-27341
JUNGER, J. J. N79-27513
JURKAUSKAS, A. Y. N79-27501

K

KAASE, H. N79-27968
KAELBERER, R. N79-27406
KAISER, M. L. N79-28103
KAKURIN, L. I. N79-27819
KALFAYAN, S. H. N79-27321
KALITA, N. F. N79-27822
KANABUS, E. W. N79-27836
KANDASWAMY, J. N79-27347
KANE, R. P. N79-27746

KAPLAN, M. H. N79-27747
KARPUSHEVA, V. A. N79-28088
KARTALOPOULOS, S. V. N79-28108
KASHANI, A. K. N79-27221
KATKOV, V. Y. N79-27825
KATTERLOHER, R. N79-27974
KATZ, I. N79-27658
KAUFFMAN, I. N79-27831
KAUFMAN, F. N79-27486
KAWAMURA, M. N79-27397
KEBLAWI, F. S. N79-27405
N79-27285
KENNEDY, B. W. N79-27465
KENNEDY, R. S. N79-27117
KERN, D. M. N79-27118
KERNWEIS, N. P. N79-27200
KERSCHGENS, M. N79-27390
KERSHNER, R. B. N79-27629
KEYZER, L. S. N79-27366
KHAN, A. D. N79-27620
KHOURY, H. N. N79-27224
KIDNAY, A. J. N79-27830
KIEHNE, H. A. N79-28029
KIESSLING, A. N79-27623
KING, J. L. N79-27282
KING, J. M., JR. N79-27678
KING, L. A. N79-27988
KING, W. R. N79-27350
KINGHORN, A. N79-27702
KIRCHHOFF, U. N79-27280
KIRST, H. N79-27364
KJOELLE, A. N79-27200
N79-27184
KLEBESADEL, R. W. N79-27951
KLEINERMANNS, C. N79-28042
KLOCKOW, D. N79-28043
KLUEH, R. L. N79-28115
KNAPP, K. N79-27287
KNAPPKE, G. N79-27721
KNECHT, D. J. N79-27535
KNOBLOCH, J. N79-27655
KNUTSSON, L. N79-27345
KOCH, H. N79-27752
KOCH, W. N79-27418
KOFF, B. L. N79-27252
KOHL, F. J. N79-27222
KOHSIEK, W. N79-27932
KOJIMA, M. N79-27151
KOLB, H. N79-27279
KOLCHINA, Y. V. N79-27766
KOLGANOVA, N. S. N79-27884
KOLTUN, D. S. N79-27593
KOMATSUZAKI, T. N79-27823
KOOIJMAN, W. N79-27823
KOPPELMAN, L. N79-27959
KORTANER, K. O. N79-27125
KOSSLER, W. J. N79-28006
KOTOVSKIY, V. F. N79-27704
KOTZ, S. N79-27882
KOUSKY, V. E. N79-27946
KOUSPARIS, D. N79-27828
KOZYREVSKAYA, G. I. N79-27898
KRACHER, A. N79-27774
KRAFT, R. E. N79-27739
KRAISS, K. F. N79-27819
KRAJNOVICH, D. J. N79-28099
KRAMER, K. N79-27934
KRAMER, L. D. N79-28048
KRETZSCHMAR, J. G. N79-27498
KRITNEN, H. J. N79-27497
KROGER, P. M. N79-27520
KRON, R. G. N79-27555
KROO, I. N79-27796
KROPP, L. N79-27940
KRUT, V. G. N79-28071
KUHLMAN, W. H. N79-27081
KUHNKE, F. N79-27556
KULIASHA, M. A. N79-28098
KULLA, J. B. N79-27112
KULLAS, M. C. N79-27758
KULVEC, A. P. N79-27412
KUO, P. S. N79-27740
KURAT, G. N79-27237
KURKINA, L. M. N79-27501
KURTZ, J. N79-27149
KVETNYANSKI, R. N79-28099
N79-27823
N79-27567
N79-27822

L

LABELLE, S. J. N79-27720
LABRUJERE, T. E. N79-27458
LABURTHE, C. N79-27083
LADELL, L. N79-27378
LAL, R. B. N79-28024
LALANNE, M. N79-27150
LAM, K. S. N79-27944
LAMB, M. N79-27099
LAMBARSKI, T. J. N79-27698
LAPSHINA, N. A. N79-27819
LARSON, B. C. N79-27250
LATTA, A. F. N79-27660
LAVERY, T. F. N79-27747
LAWRENCE, A. R. N79-28088
LAWVER, B. R. N79-28108
LEA, R. N. N79-27221
LEAHEY, D. M. N79-27825
LEBOT, Y. N79-27974
N79-27658
LECHT, M. N79-27831
LECLERC N79-27486
LECOZ, J. J. N79-27397
LEE, J. T. N79-27405
LEE, K. H. N79-27285
LEE, L. L. N79-27465
LEE, Y. T. N79-27117
LEES, L. N79-27118
LEGA, P. N79-27200
LEGROS, C. N79-27390
LEGUILLY N79-27629
LEHRKE, H. P. N79-27366
LEMAIRE, J. N79-27620
LENZEN, R. N79-27224
LEPPIHALME, M. N79-27830
LEPPING, R. P. N79-28029
LEROY N79-27623
LESKOVAR, B. N79-27282
LEUNG, R. T. P. N79-27678
LEVEK, R. J. N79-27988
LEWONTIN, R. C. N79-27350
LIEBERMAN, J. R. N79-27702
LIM, R. N79-27280
LIN, J. D. N79-27364
LIN, J. T. N79-27200
LINDAU, O. N79-27184
LINDSEY, T. H. N79-27951
LINDSTROM, R. E. N79-28042
LINH, N. T. N79-28043
N79-28115
LINK, J. F. N79-27287
LIPSCHUTZ, R. N79-27721
LISAK, M. N79-27535
LISHER, B. J. N79-27655
N79-27345
LISLE, R. V. N79-27752
LITT, F. X. N79-27418
LIU, C. C. N79-27252
LIU, H. T. N79-27222
LIU, M. K. N79-27932
N79-27151
LIU, W. S. N79-27279
LIZDAS, D. J. N79-27766
LLOYD, A. C. N79-27884
LO, C. C. N79-27593
LO, C. Y. N79-27823
LOCKE, F. E. N79-27823
LOISEAU, H. N79-27959
LONG, R. R. N79-27125
LONGHETTO, A. N79-28006
LORA, J. H. N79-27704
LORENSEN, L. E. N79-27882
LORENZO, C. F. N79-27946
LOTTER, K. W. N79-27828
LOWMAN, P. D., JR. N79-27898
LUCIA, P. C. N79-27774
LUGANNANI, R. N79-27739
LUSTMAN, L. N79-27819
LUX, R. A. N79-28099
LYNCH, J. F. N79-27934
LYNEY, R. N79-28048
LYNN, K. G. N79-27498
LYON, E. F. N79-27497
N79-27520
N79-27555
N79-27796
N79-27940
N79-28071
N79-27081
N79-27556
N79-28098
N79-27112
N79-27758
N79-27412
N79-27740
N79-27237
N79-27501
N79-27149
N79-28099
N79-27823
N79-27567
N79-27822

M

MACDONALD, J. R. N79-27751
MACKEY, E. F. N79-27482
MACNAMARA, P. N79-27376
MACTURK, W. L. N79-27249
MAGGI, W. N79-27912
MAGGIORI, D. N79-27375
N79-27382
MAGHSOODI, R. N79-27379
MAHN, N. N79-28059
MAHRER, K. D. N79-27735
MAIDMENT, D. N79-27627
MAJOR, R. W. N79-27976
MAKSIMOV, I. V. N79-27827
MALOY, J. E. N79-27236
MANCUSO, R. L. N79-27576
MANDELL, M. J. N79-27397
MANDWEWALA, N. N79-28081
MANEY, C. T. N79-27226
MANGANO, G. J. N79-27166
MANINTVELD, P. N79-28006
MANION, F. M. N79-27517
MANSO, A. P. N79-27641
MANVILLE, P. N79-27227
MAQUENNENHAN, B. N79-27178
MARCHAND, M. N79-27726
MARINE, I. W. N79-27961
MARKS, J. E. N79-27590
MARSDEN, R. G. N79-27989
MARSH, H. E. N79-27326
MARSHALL, F. E. N79-28092
MARTE, J. E. N79-27091
MARTIN, G. P. N79-27575
MARTIN, I. M. N79-28053
MARTINELLI, G. N79-27323
MASCARENHAS, N. D. A. N79-27629
MASH, C. J. N79-27552
MASSIES, J. N79-27433
N79-27434
MATHIS, D. E. N79-27176
MATLIN, R. W. N79-27708
MATSAKIS, D. N. N79-27315
MAUGHMER, M. D. N79-27773
MAURER, G. S. N79-27346
MAYERHOFER, P. M. N79-27481
MAYFIELD, E. B. N79-27498
MAYO, S. N79-27193
MCCLATCHEY, R. A. N79-27595
MCCONE, A. I. N79-27585
MCCORD, T. B. N79-27708
MCCORMICK, D. N79-27526
MCDANIEL, H. N79-28107
MCDONALD, K. R. N79-27984
MCDONALD, M. J. N79-27981
MCELROY, J. N79-28104
MCFARLAND, B. L. N79-27708
MCGOWAN, P. R. N79-27410
MCILVENNA, J. N79-27801
MCKEE, J. N79-27129
MCLAIN, A. G. N79-27908
MCMASTERS, J. H. N79-27813
MCMURTREY, E. L. N79-27669
MCMURTREY, J. E., III N79-27632
MCNAB, A. L. N79-27544
MCNELIS, D. N. N79-27109
MEADOR, T. A. N79-27180
MEI, C. C. N79-27280
MEIER, P. G. N79-27414
MEIER, P. M. N79-28031
MELTON, W. C. N79-27934
MELZIG, H. D. N79-27554
MENAGLIA, F. N79-28004
MENESES, P. R. N79-27856
MENEZES, E. A. N79-27857
MENTEL, J. N79-27479
N79-27073
MERTENS, I. N79-27356
MESMER, R. E. N79-27544
MEUNIER, R. F. N79-27551
MEYER, H. D. N79-27568
MEYER, J. N79-27467
MICHERON, F. N79-27333
MIELING, G. E. N79-27575
MIESCKE, K. J. N79-27410
MIKHAYLOV, V. M. N79-27897
MILAZZO, P. J. N79-27669
MILLER, B. N79-27178
MILLER, D. R. N79-27466
MILLER, J. R. N79-27565
MILLER, R. A. N79-27338
MILLS, M. T. N79-27669
MINEAR, J. W. N79-27663
MIRANDA, L. C. M. N79-27168
MITCHELL, D. H. N79-27748
MITCHELL, J. G. N79-27755
MITTRA, R. N79-27359
MIXON, W. R. N79-27090
MOACANIN, J. N79-27736
MOCK, W., JR. N79-27608
MOHRE, D. L. N79-27862
MONGIA, H. C. N79-27946
N79-27677
MOONEY, H. M. N79-27751
N79-27482
MORAWA, C. N79-27376
MORELLI, P. N79-27249
MORENO, G. N79-27912
MORGAN, J. D., III N79-27375
MORITZ, P. S. N79-27382
MORITZ, R. R. N79-27379
MOROZOVA, N. P. N79-28059
MORRIS, C. E. K., JR. N79-27735
MORRIS, W. D. N79-27627
MORT, K. W. N79-27976
MOSCATELLI, A. N79-27827
MOTSCHMANN, H. N79-27236
MOTSINGER, R. E. N79-27576
MOUNT, R. D. N79-27397
MOYER, H. G. N79-28081
MUANGNOICHAROGEN, N. N79-27226
MUDGE, L. K. N79-27166
MUNGUR, P. N79-28006
MUNN, R. E. N79-27517
MUSER, D. N79-27641
MUSHOTZKY, R. F. N79-27227
MUTCHLER, G. S. N79-27178
N79-27726
N79-27961
N79-27590
N79-27989
N79-27326
N79-28092
N79-27091

N

NAPOLITANO, L. G. N79-27438
NARAYAN, J. N79-27250
NARDI, J. C. N79-27280

NATARAJAN, K. M. N79-27301
NATOCHIN, Y. V. N79-27819
NAWO, B. N79-27968
NAZIROV, R. R. N79-27197
NEDGAARD, I. N79-27764
NEDOLUHA, A. K. N79-27405
NEKHAYEV, A. S. N79-27819
NELSON, R. H. N79-28051
NELSON, W. H. N79-27188
NEPOMUCENO, L. X. N79-27522
N79-27523
NESBIT, L. A. N79-27292
NESS, N. F. N79-28104
NESTLER, D. E. N79-27441
N79-27442
N79-27444
N79-27445
N79-27446
NEUBAUER, F. M. N79-28104
NEUMYVAKIN, I. P. N79-27819
NEWMAN, B. A. N79-27310
NEWMAN, J. N79-27666
NEWMAN, J. C., JR. N79-27532
NEWTON, H. J. N79-27901
NEZELEK, F. A. N79-27867
NICHOLAS, T. N79-27293
NICKEL, U. N79-27123
NIEMANN, B. L. N79-27577
NIEMEYER, S. N79-28095
NIEUWSTADT, F. T. M. N79-27790
NIGBOR, R. J. N79-27411
NIKOLAEVA, N. S. N79-27763
NILSSON, N. J. N79-27886
NITSCHE, V. N79-27134
NOHEL, J. A. N79-28038
NOLL, K. E. N79-27590
NORCO, J. E. N79-27590
NOSOVA, Y. A. N79-27823
NOVAK, F. A. N79-27943
NOVAK, J. T. N79-27816
NUSSBAUM, ?. N79-27130
NYE, N. B. N79-27709
NYQUIST, L. E. N79-28102

O

OERLEMANS, J. N79-27788
OESTREICH, G. J. N79-27266
OGLEBAY, J. C. N79-27236
OGONOWSKI, J. M. N79-27518
OGORODNIKOVA, L. G. N79-27818
OKFKY, R. S. N79-27496
OKON, E. E. N79-27928
OLBERT, S. N79-28109
OLIVA, J. N79-28021
OLIVIER, E. N79-28076
OLIVIER, J. N79-27414
OLSEN, W. N79-27930
OLSON, J. E. N79-27840
OLSON, L. E. N79-27100
OPSTEEGH, J. D. N79-27789
ORMISTON, R. A. N79-27084
ORMSBEE, A. I. N79-27092
ORWIG, L. E. N79-28077
OSBORN, J. N79-27903
OSER, J. N79-27107
OSSAKOW, S. L. N79-27754
OTTEN, T. H. N79-28051
OTTO, C. H., JR. N79-27669
OWEN, H. A. N79-27396
OWENS, A. H. N79-28020
OXLEY, J. H. N79-27599

P

PADDOCK, R. A. N79-27808
PAE, K. D. N79-27310
PAGNIER, P. N79-28076
PALLOTTINO, G. V. N79-27380
PALMER, F. H. N79-27354
N79-27355
PANCHENKO, V. S. N79-27825
PANGBORN, J. B. N79-27328
PANOFSKY, H. A. N79-27554
PAPAY, L. T. N79-27612
PAPPAS, T. A. N79-27684
PARABONI, A. N79-27375
N79-27382
PARADELLA, W. R. N79-27356
PARHAMI, P. N79-27365
PARKS, D. E. N79-27397
PARZEN, E. N79-27901
PATCH, R. W. N79-27664
PATHAK, P. N. N79-27194
PAULKOVICH, J. N79-27394
PAULSON, D. G. N79-27546
PEARCE, J. B. N79-28103
PEARSON, M. N79-27730
PECHMAN, J. C. N79-27807
PEDERSON, L. R. N79-28013
PEDLEY, T. J. N79-27846
N79-27847
PEDROSA, R. H. L. N79-27642
PEERLESS, S. J. N79-27277
PELLERGRIN, M. T. N79-27475
PEMBERTON, R. C. N79-27290
PENNICK, H. G. N79-27520
PEREIRA, T. J. C. N79-27899
PERLSTADT, M. A. N79-27892
PERRY, J. E. N79-28084
PESCHEL, W. N79-27153
PETERS, C. N79-27894
PETERSEN, W. B. N79-27558
PETERSON, F. N79-27700
PETERSON, J. N79-27630
N79-27631
N79-27156
PETERSON, M. R. N79-27992
PETERSON, R. R. N79-27828
PETUKHOVA, G. N. N79-27966
PHILLIPS, G. C. N79-28102
PHINNEY, W. C. N79-27987
PIAZZOLLA, S. N79-27985
PICCARI, L. N79-27129
PIERCE, N. J. N79-27071
PIERSON, B. L. N79-27799
PIETRAFESA, L. J. N79-27749
PILCHOWSKI, H. U. N79-27852
PINCUS, J. H. N79-27704
PINE, G. D. N79-27750
PINNICK, R. G. N79-27730
PITCHFORD, M. L. N79-27863
PITT, D. A. N79-27380
PIZZELLA, G. N79-27762
N79-28115
PIZZICHINI, G. N79-28110
PIZZO, V. J. N79-27835
PLAKHUTA-PLAKUTINA, G. I. N79-27314
PLODINEC, M. J. N79-27965
N79-27933
PLUMBLEE, H. E. N79-27401
PLUMER, J. A. N79-28105
PODGORNY, I. M. N79-27307
PODLASECK, S. E. N79-27414
POIRIER, R. N79-28019
POKER, D. B. N79-27564
POLSTER, G. N79-27613
POPE, M. N79-27821
PORTUGALOV, V. V. N79-28105
POTANIN, Y. N. N79-27093
POTONIDES, H. C. N79-27161
POTTER, R. G. N79-27118
POTTER, W. F. N79-27572
PRAHM, L. P. N79-27716
PRATT, R. W. N79-28078
PRAVDO, S. H. N79-28092
N79-28002
PRESS, W. J. N79-27185
PRESTON, O. W. N79-27285
PREUSS, A. W. N79-27286
N79-28077
PRICE, K. M. N79-27841
PRIVITZER, E. N79-27516
PRUSAITIS, W. F. N79-27549
PUTTOCK, J. S.

Q

QASRAWI, A. M. S. N79-27190
QUICK, W. H. N79-27975
QUIGG, C. N79-28039
QUONG, R. N79-27669

R

RAAFF, W. R. N79-27727
RABLE, V. A. N79-28063
RADBILL, J. R. N79-27091
RADICK, R. R. N79-28074
RAGULSKIS, K. M. N79-27501
RAJU, I. S. N79-27532
RASCHKE, E. N79-27389
RATERINK, H. J. N79-27485
RATHMANN, D. N79-28040
RAU, J. G. N79-27611
RAUFER, R. K. N79-27590
RAY, R. N79-28018
RAY, R. M. N79-27756
RAYNOR, G. S. N79-27557
REDMANN, G. H. N79-27091
REED, J. W. N79-27668
REICHERT, G. N79-28092
REICKE, N. N79-27074
REID, J. D. N79-27569
REID, T. F. N79-27871
REIFF, J. N79-27787
REIGBER, C. N79-27223
REILLY, W. W. N79-27321
REITER, R. W., JR. N79-27880
RENARD, V. N79-27810
RENWICK, W. H. N79-27622
REPETTO, F. N79-27586
REYNOLDS, G. A. N79-27464
REYNOLDS, G. W. N79-27596
REYNOLDS, J. M. N79-27590
REYNOLDS, R. S. N79-27145
N79-27146
RICHARDS, F. R. N79-27132
RICHTER, P. H. N79-27660
RICINIELLO, F. N79-27912
RICKER, T. N79-27424
RICOTTA, A. N79-27381
RIDDLE, A. C. N79-28103
RIFFEL, R. E. N79-27180
RINALDI, S. N79-27627
RINGBLOM, L. N79-27700
ROBERTS, J. J. N79-28063
ROBERTUS, R. J. N79-27327
ROBIE, R. B. N79-27606
ROCCHIA, R. N79-28076
RODAL, J. J. A. N79-27162
RODEMAUN, H. N79-27757
RODRIGUEZ, D. J. N79-27571
RODRIGUEZ, G. E. N79-27394
ROEDDE, A. N79-28079
N79-28085
ROENICKE, G. N79-27721
ROGANI, A. N79-27954
ROMAINE, W. R. N79-27677
ROMANOVA, N. N. N79-28098
ROMANOWSKI, T. A. N79-27960
ROMEO, G. N79-27077
ROONEY, D. M. N79-27802
ROSE, J. L. N79-27297
ROSEN, J. M. N79-27753
ROTENBERG, M. N79-27397
ROTH, E. P. N79-28017
ROTH, P. M. N79-27568
ROTHROCK, M. D. N79-27180
ROWE, R. D. N79-27548
ROYER, E. R. N79-27815
ROZENTAL, I. L. N79-28041
RUBIN, E. L. N79-27450
RUBY, J. D. N79-27667
RUFF, L. J. N79-27807
RUNSTADLER, P. W., JR. N79-27478
RUPPE, H. O. N79-27707
RUSH, C. M. N79-27387
RUSSELL, L. M. N79-27142
RUSSELL, R. N79-27483
RUSSER, P. N79-27383

S

SAGDEEV, R. Z. N79-28007
SAGERMAN, G. D. N79-27665
SAGERT, P. G. N79-27545
SALIK, J. N79-27306
SALIKUDDIN, M. N79-27933
SALVINO, J. T. N79-27166
SANDER, G. J. N79-27073
SANDIFER, R. H. N79-27536
N79-27537
N79-27538
N79-27539
SANI, R. L. N79-27571
SARABER, M. J. M. N79-27787
SARDELLA, C. N79-28003
SARIC, W. S. N79-27464
SASAKI, Y. N79-27773
SAURIER, G. H. N79-27510
N79-27511
N79-27512
SAVILOV, A. A. N79-27819
SAWYER, R. J., JR. N79-27799
SAWYER, W. C. N79-27099
SCATTOLINI, R. N79-27649
SCHAEDLICH, E. N79-27952
SCHAEFER, G. N79-27712
SCHAEFFEL, J. A., JR. N79-27935
SCHANK, J. N79-27921
SCHAUER, U. N79-27760
SCHEGGI, A. M. N79-27986
SCHEINBEIM, J. I. N79-27310
SCHEK, H. J. N79-27760
SCHINNAR, A. P. N79-28046
SCHLINGER, W. G. N79-27614
SCHMIDT, R. N79-27319
SCHMIDT, S. P. N79-27281
SCHMIDT, W. N79-27074
SCHNEIDER, B. N79-27171
SCHNEIDER, E. M. N79-28117
SCHNEIDER, H. M. N79-27411
SCHNUELLE, G. W. N79-27397
SCHOEN, M. L. N79-27185
SCHOENAUER, W. N79-27104
N79-27106
SCHOFIELD, D. N79-28053
SCHREIECK, R. N79-27153
SCHREYER, G. N79-27408
SCHROTER, R. C. N79-27845
SCHUBERT, L. N79-28052
SCHULTZ, D. L. N79-27191
SCHULZ, M. N79-27426
SCHULZ, P. A. N79-27498
SCHUMACHER, R. W. N79-27991
SCHUSTER, G. B. N79-27281
SCHUURMANS, C. J. E. N79-27796
SCHWARTZ, R. G. N79-27299
SCHWELLINGER, U. N79-27214
SCUDDER, J. D. N79-28109

SEALOCK, L. J., JR. N79-27327
SEARS, M. P. N79-28016
SEED, W. A. N79-27850
SEGUI, Y. N79-27399
SEITE, C. N79-27413
SENADOR, R. N79-28117
SESSIONS, B. N79-27238
SHALABI, M. A. N79-27320
SHALIT, B. N79-27859
SHALLON, C. R. N79-27891
SHANKER, R. N79-27704
SHANNON, D. W. N79-27679
SHANNON, T. E. N79-28003
SHAPIRO, V. D. N79-28007
SHAW, R. W. N79-27584
SHAW, T. E. N79-27447
SHEN, C. Y. N79-27428
SHEN, Y. R. N79-27498
SHERMAN, C. A. N79-27570
SHERRELL, F. G. N79-27484
SHEVCHENKO, V. I. N79-28007
SHEYKIN, A. A. N79-27826
SHIH, T. T. N79-27520
SHIMABUKURO, F. I. N79-28106
SHKOLNIKOVA, S. I. N79-28105
SHOWEN, R. L. N79-27361
SHVETS, V. N. N79-27824
SIKKA, V. K. N79-27298
SILVA, W. J., JR. N79-27734
SILVERQVIST, K. N79-27506
SIMMONDS, A. C. N79-27547
SIMONEAU, R. J. N79-27461
SIMONET, W. N79-28032
SIMPSON, T. R. N79-27118
SINCLAIR, R. M. N79-27300
SINGH, G. P. N79-27297
SIQUEIRA, M. A. A. N79-28026
SISEFSKY, J. N79-27970
SIVERTSEN, B. N79-27566
SIVO, J. N. N79-27351
SKAMSER, R. N79-27331
SKLAREW, R. C. N79-27573
N79-27574
SLAWSON, P. R. N79-27581
SLIWA, D. J. N79-27072
SLIWA, S. M. N79-27072
SLONSKI, M. L. N79-27658
SMIRNOV, A. S. N79-28098
SMIRNOV, V. N. N79-28093
SMITH, B. A. N79-27188
SMITH, B. W. N79-28092
SMITH, C. E. N79-28012
SMITH, D. F. N79-27265
SMITH, F. G. N79-28084
SMITH, N. K. N79-28037
SMITH, R. D. N79-27342
SMITH, R. E. N79-27183
SMITH, R. T. N79-27525
SMOAK, R. H. N79-27251
SMOLDEREN, J. N79-27449
SMOOT, L. D. N79-27330
SMYTH, R. K. N79-27087
SNELLING, R. N. N79-27730
SNODDY, W. C. N79-27500
SOBEY, I. J. N79-27472
SOBIECZKY, H. N79-27144
SOENTGERATH, W. N79-27371
SOER, G. J. R. N79-27645
SOLOMON, M. N79-27883
SOMEDA, C. G. N79-27986
SOMERS, D. M. N79-27098
SONCINI-SESSA, R. N79-27627
SPALDING, D. B. N79-27277
SPALDING, I. J. N79-27494
SPAMPINATO, P. T. N79-28003
SPANGLER, T. C. N79-27545
SPEELPENNING, B. N79-27906
SPIGEL, R. H. N79-27625
SPIZZICHINO, A. N79-28115
SRINIVASAN, M. N79-27251
STAGLIANO, T. R. N79-27162
STANKIEWICZ, N. N79-27400
STEARNS, C. A. N79-27279
STECKER, F. W. N79-28090
N79-28091
STEDMAN, M. N79-28116
STEEN, P. G. N79-28083
STEIDLER, F. N79-27397
STEINHAUSER, F. N79-27760
STEPANTSOV, V. I. N79-28060
STEPHAN, K. H. N79-27825
STEPHENS, J. R. N79-27968
STEWART, D. A. N79-27275
STIFFLER, J. J. N79-27568
STOCKTON, R. J. N79-27866
STOKES, J. N79-27156
STOLFO, S. J. N79-27773
STONE, R. H. N79-27876
STOTSKIY, A. A. N79-27246
STRAHAN, V. H. N79-28073
STREIT, R. D. N79-27975
STRINGFIELD, R. M., JR. N79-27530
STRIZAK, J. P. N79-27955
STROH, J. N79-27535
STRONACH, C. E. N79-27422
STUCKAS, K. J. N79-28025
SUDHOF, A. S. N79-27719
SULLIVAN, J. D. N79-27498
SULLIVAN, R. J. N79-27897
SUMSION, H. T. N79-27443
SUNU, W. G. N79-27243
SUTHERLAND, W. M. N79-27666
SUTTERLIN, R. N79-27234
SVENSSON, P. N79-27540
SWABB, L. E., JR. N79-28054
SWAFFORD, T. W. N79-27618
SWAIN, R. L. B. N79-27102
SWITHENBANK, J. N79-27173
SZECHENYI, E. N79-27278
N79-27178

T

TADEUSIAK, A. N79-27987
TAKAHASHI, H. N79-27745
TAKAYAMA, K. N79-27467
TANAKA, K. N79-27960
TANAKA, N. I. N79-27642
TANNER, R. L. N79-27723
TARLE, G. N79-28113
TASHPULATOV, R. Y. N79-27820
TAUTON, J. W. N79-27618
TAYLOR, P. A. N79-27550
TAYLOR, R. E. N79-28062
TEBALDI, G. N79-27595
TEIXEIRA, D. P. N79-27609
TEMPLETON, M. K. N79-27785
TENNERY, V. J. N79-27681
TESSMER, R. G., JR. N79-27692
TETER, M. P. N79-27075
TEVLEY, W. C. N79-28074
THIEMAN, J. R. N79-28103
THOMA, W. N79-27384
THOMAS, D. V. N79-28084
THOMEE, V. N79-27911
THOMPSON, E. M. N79-27732
THOMPSON, J. K. N79-27496
THOMPSON, P. A. N79-28040
THOMPSON, R. A. N79-27702
THRANE, E. V. N79-27591
N79-27593
THRASHER, J. W. N79-27575
TIEDEMANN, H. A. N79-27748
TIGRANYAN, R. A. N79-27822
TISCHLER, R. N79-27883
TONG, E. Y. N79-27579
TORDA, T. N79-27822
TORGESON, D. R. N79-28029
TOY, M. S. N79-27311
TRAINOR, J. H. N79-28115
TRAYBAR, J. J. N79-27125
N79-27127
TREADWAY, D. G. N79-27234
TREE, D. J. N79-27156
TRITCHLER, D. N79-27900
TRIVEDI, N. B. N79-27746
N79-27747
N79-28088
N79-28108
TROMPETTE, P. N79-27150
TROSHIKHIN, G. V. N79-27829
TROSHIN, A. Z. N79-27831
TROUT, D. A. N79-27582
TRUBACHEV, I. N. N79-27834
TSACOYEANES, C. W. N79-27752
TSAI, C. Y. N79-27436
TSAI, S. W. N79-27248
TUCKER, C. J. N79-27637
N79-27638
N79-27639
TUERPE, D. R. N79-27571
TUKENMEZ, E. N79-27337
TURBERVILLE, L. N79-27232
TURFLER, R. M. N79-27698

U

ULANSKI, S. L. N79-27786
URASEK, D. C. N79-27143
URISH, D. W. N79-27733
USPENSKIY, L. S. N79-27828
UTKIN, V. N. N79-27831

V

VAISBERG, O. L. N79-28093
VANALLEN, J. A. N79-28065
VANDENDOOL, H. M. N79-27796
VANDEVOOREN, A. I. N79-27455
N79-27456
VANDOREN, A. H. N79-27869
VANHEESCH, E. J. M. N79-28006
VANKRIEKEN, A. H. N79-27485
VANLEHN, K. N79-28050
VANVOORSTVADER, F. N79-27317
VARGAS, H. N79-28026
VARGAS, J. I. N79-28026
VAUGHAN, M. F. N79-27289
VENANZI, C. A. N79-27942
VENKATRAM, A. N79-27567
VIDALSAINT ANDRE, B. N79-27376
VIGASH, M. N79-27822
VINTERSVED, I. N79-27970
VIOLINI, G. N79-27953
VISSER, J. N79-27318
VISWANADHAM, Y. N79-27775
VITKUTE, A. Y. N79-27501
VLEGHERT, J. P. K. N79-27169
VOGT, K. J. N79-27564
VOLOSHIN, V. G. N79-27825
VONDERHAAR, T. H. N79-27770
VONDERMUHLL, A. R. N79-27163
VOS, J. J. N79-27853
VOSS, N. N79-27215
VOSS, W. C. N79-27617

W

WACO, D. E. N79-27772
WADA, W. W. N79-27960
WAGNER, H. G. N79-27285
N79-27288
WAKELYN, N. T. N79-27717
WALKER, G. N79-27503
WALKUP, P. C. N79-27327
WALTER, J. V. N79-28033
WALTON, H. N79-27337
WALTON, J. J. N79-27570
WARD, W. W. N79-27218
WARNER, T. T. N79-27591
WARREN, R. J. N79-27520
WARREN, W. R. N79-27493
WARWICK, J. W. N79-28103
WASSUM, D. L. N79-27099
WATKINS, M. L. N79-27136
WATSON, R. W. N79-27885
WAXTER, R. M. N79-27990
WAYMAN, M. N79-27338
WEAVING, J. H. N79-27586
WEBER, A. H. N79-27559
WEBER, G. W. N79-27681
WEBSTER, W. J., JR. N79-27748
WEIL, J. C. N79-27562
WEISS, D. J. N79-27878
WEISSMAN, J. C. N79-27650
WELCH, J. D. N79-27119
WELCH, N. D. N79-27977
WELLS, C. H. N79-27519
WENDT, U. N79-27919
WESELY, M. L. N79-27722
WESSON, T. C. N79-27756
WESTON, R. C. N79-27417
WETZEL, P. J. N79-27731
WEVODAU, R. L., JR. N79-27583
WEYER, H. B. N79-27176
WHITCOMB, J. D. N79-27245
WHITCOMB, J. H. N79-27807
WHITE, G. S. N79-28015
WHITE, N. E. N79-28078
WHITTEN, B. T. N79-27187
WHITTENBURG, S. L. N79-27972
WICKERTS, S. N79-27793
N79-27794
WIDNALL, S. E. N79-27436
WIEMER, W. N79-27216
WILEY, J. R. N79-27314
WILHEIT, T. T. N79-27635
N79-27640
WILHELMSSON, H. N79-28004
WILLIAMS, R. C. N79-27093
WILSON, L. W. N79-28112
WILSON, P. M. N79-27396
WILSON, R. B. N79-27161
WILSON, T. G. N79-27396
WILSON, T. L. N79-27479
WINSOR, N. K. N79-27998
WISNIEWSKI, H. L. N79-27239
WITMER, E. A. N79-27162
WITTLIN, G. L. N79-27116
WOLF, D. E. N79-27576
WOLF, J. S. N79-27082
WOLF, N. O. N79-28011
WOLFE, P. S. N79-27879
WOLFRAM, G. N79-27319
WOLOSEWICZ, R. M. N79-27674
WONG, J. K. N79-27161
WOOD, W. B. N79-27615
WOODING, M. S. N79-27172
WOOTEN, W. H. N79-27126
WORRELL, T. D. N79-27590
WORSTELL, M. H. N79-27670
WRIGLEY, B. N79-27139
WYANT, T. S. N79-27915
WYATT, J. R. N79-27496

Y

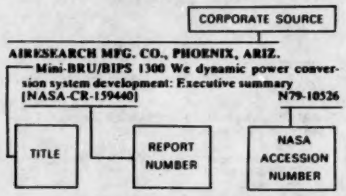
YAKNOVA, Y. N79-27822
YANCIK, J. J. N79-27607
YANKO, V. M. N79-27861
YEE, Y. P. N79-27798

Z

YESAVAGE, V. F. N79-27282
YIM, U. J. N79-27667
YOCKE, M. A. N79-27551
YOUNG, J. W. S. N79-27588
YU, I. P. N79-27348
ZACHARIAS, F. A. N79-27508
ZAVOLI, W. B. N79-27361
ZHERNAKOV, A. F. N79-27832
ZHILIS, B. G. N79-27828
ZIEGENBEIN, J. N79-27922
ZUGHUL, M. B. A. N79-27274
ZWEMER, D. A. N79-28010
ZWISSLER, J. N79-27654
ZYBIN, O. K. N79-27831

CORPORATE SOURCE INDEX

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ACADEMY OF SCIENCES [USSR], MOSCOW.
Unmodeled perturbation effect on the orbit determination accuracy
[PR-433] N79-27197
Energetic electron fluxes in the earth's outer magnetosphere according to observations from the Prognoz-3 station
[PR-415] N79-27763
Langmuir turbulence and dissipation of high frequency energy
[PR-353] N79-28007
On the existance of physical spaces with a dimensionality of N not equals 3 + 1
[PR-400] N79-28041
On the reliability of heavy ion detection in the plasma flow near M
[PR-427] N79-28093
Study on the ultraviolet radiation of the atmosphere of Venus
N79-28098
On the possibility of determining the Venus magnetic moment from magnetic measurements in the tail
[PR-432] N79-28105

ADDIS TRANSLATIONS INTERNATIONAL, PORTOLA VALLEY, CALIF.
Study of a method for filtering optical images
[BNWL-TR-343] N79-27979
Study of a method for filtering optical images
[BNWL-TR-342] N79-27980

ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT, NEUILLY-SUR-SEINE [FRANCE].
Stresses, vibrations, structural integration and engine integrity [including aeroelasticity and flutter]
[AGARD-CP-248] N79-27148
Small turbines: Experiences with disk ruptures
N79-27163
Guidance and control for tactical guided weapons with emphasis on simulation and testing
[AGARD-LS-101] N79-27225
Aerospace propagation media modelling and prediction schemes for modern communications, navigation, and surveillance systems
[AGARD-LS-99] N79-27385

AEG-TELEFUNKEN, FRANKFURT AM MAIN [WEST GERMANY].
Electrochemical apparatus for analyzing carbon monoxide, hydrogen sulfide, hydrogen and sulfur dioxide
[BMFT-FB-T-78-08] N79-27729

AEG-TELEFUNKEN, HEILBRONN [WEST GERMANY].
Etching of micropatterns over large areas using electron beam technology
[BMFT-FB-T-78-18] N79-27424
Integrated high frequeacy circuits
[BMFT-FB-T-78-24] N79-27427

AEG-TELEFUNKEN, ULM [WEST GERMANY].
Electronic components for high speed signal processing in fiber optical communication
[BMFT-FB-T-77-75] N79-27383

AERITALIA S.P.A., TORINO [ITALY].
Spacelab follow-on development: Executive summary. Heat rejection augmentation and increased capability for the Spacelab liquid loops
[RP-AI-0239] N79-27238

AERODYNAMICS RESEARCH CORP., SARATOGA, CALIF.
The numerical solution of the nonsimilar laminar boundary-layer equations including the effects of nonequilibrium dissociation
N79-27440

AEROJET LIQUID ROCKET CO., SACRAMENTO, CALIF.
High performance N2O4/amine elements blowapart
[NASA-CR-160272] N79-27323
High performance N2O4/amine elements blowapart
[NASA-CR-160273] N79-27324

AEROMECHNICAL TECHNOLOGY SERVICES, MANSFIELD, OHIO.
Contemporary soaring nomenclature
N79-27085

AERONAUTICAL RESEARCH INST. OF SWEDEN, STOCKHOLM.
Investigations of interference effects in a wind tunnel caused by a model support strut on a reflection plane mounted half model
[FFA-TN-AU-1335:2] N79-27109
Calculation of pressure distribution for a wing-body combination at subsonic Mach numbers
[FFA-TN-AU-1091] N79-27110
User manuals for three computer programs for analysis of composite materials [LOPT, SOPT, SOC]
[FFA-TN-HU-2054] N79-27252

AEROSPACE CORP., EL SEGUNDO, CALIF.
Solar Heating and Cooling Of Buildings [SHACOB] requirements definition and impact analysis
[EPRI-ER-808-VOL-1] N79-27687
Synoptic radio maps of the sun at 3.3mm, 1970-1973
[UAG-66] N79-28106

AIN SHAMS UNIV., CAIRO [EGYPT].
Egypt as seen by LANDSAT
N79-27626

AIR FORCE ACADEMY, COLO.
Measurement of transport properties of several N-alkylpyridinium halides and their mixtures with aluminum chloride
[AD-A067763] N79-27280

AIR FORCE AERO PROPULSION LAB., WRIGHT-PATTERSON AFB, OHIO.
GRAPH: An interactive computer program used for technical plotting
[AD-A068668] N79-27881

AIR FORCE AVIONICS LAB., WRIGHT-PATTERSON AFB, OHIO.
Tactical missile performance requirements: A methodology for development
N79-27226
New methods in the terminal guidance and control of tactical missiles
N79-27228
Propagation effects on satellite communication systems operating in the range of 240 to 3000 megahertz
[AD-A067535] N79-27358

AIR FORCE FLIGHT DYNAMICS LAB., WRIGHT-PATTERSON AFB, OHIO.
Effects of geometric variables on stress intensity factors for crack gages
[AD-A068631] N79-27533

AIR FORCE GEOPHYSICS LAB., HANSCOM AFB, MASS.
Modelling of the visible/infrared propagation environment
N79-27388
An introduction to the AFGL Magnetometer network
[AD-A068979] N79-27752

AIR FORCE HUMAN RESOURCES LAB., BROOKS AFB, TEX.
F-15 flight simulator: Development and analysis of computer scoring algorithm
[AD-A067765] N79-27188

AIR FORCE MATERIALS LAB., WRIGHT-PATTERSON AFB, OHIO.
Introduction to composite materials. Volume 1: Deformation of unidirectional and laminated composites
[AD-A067544] N79-27248

AIRESEARCH MFG. CO., PHOENIX, ARIZ.
Combustor design criteria validation. Volume 2: Development testing of two full-scale annular gas turbine combustors
[AD-A067689] N79-27145
Combustor design criteria validation. Volume 1: Element tests and model validation
[AD-A067657] N79-27146
Three-dimensional finite-element techniques for gas turbine blade life prediction
N79-27156

ALABAMA A & M UNIV., NORMAL.
Preparation of guinea pig macrophage for electrophoretic experiments in space
[NASA-CR-158777] N79-27814
A study of crystal growth by solution technique
[NASA-CR-158763] N79-28024

ALABAMA UNIV., UNIVERSITY.
Multidimensional high resolution gas liquid chromatography in trace organic analysis: Heartcutting with intermediate trapping
N79-27273
The existence of matrices with prescribed characteristic polynomials
N79-27887

ALSID, SNOWDEN AND ASSOCIATES, BELLEVUE, WASH.
Solvent Refined Coal [SRC] process: Environmental program. Volume 3: Pilot plant development work, part 5
[FE-0496-T8] N79-27329

APPLETON LAB., SLOUGH [ENGLAND].
Propagation at medium and high frequencies. 1: Practical radio systems and modelling needs
N79-27386
Propagation at medium and high frequencies. 2: Long and short-term models
N79-27392

APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., LAUREL, MD.
Very low altitude drag-free satellites
[PB-293271/3] N79-27224

ARGONNE NATIONAL LAB., ILL.
Transient heat transfer in concrete
[CONF-781079-4] N79-27469
Reliability and maintainability evaluation of freezing in solar systems
[ANL/SDP/TM-78-3] N79-27674
Metal hydride solar heat pump and power system [HYCSOS]
[CONF-781133-5] N79-27675
Performance of a hydraulic air compressor for use in compressed air energy storage power systems
[CONF-781202-27] N79-27693
Recovery of wasted heat with centralized and distributed heat pump systems
[CONF-781202-32] N79-27696
Environmental assessment for the electric hybrid vehicle demonstration project, performance standards and financial incentives
[ANL/EES/TM-22] N79-27720
Relationship between pH value and electrolyte composition of precipitation
[ANL-TRANS-1149] N79-27721
Behavior of the thermal skin of cooling pond waters subjected to moderate wind speeds
[CONF-781213-3] N79-27722
Comparison of model and observed nearshore circulation
[ANL/EES-CP/22] N79-27808
Physics of reactor safety
[PB-293662/3] N79-27971
Two-dimensional MHD channel design
[CONF-781234-1] N79-28000
Computer software for planning design of community energy systems
[CONF-781182-2] N79-28063

ARINC RESEARCH CORP., ANNAPOLIS, MD.
F-16 reliability improvement warranty. Implementation and management plan
[AD-A068561] N79-27133

ARIZONA UNIV., TUCSON.
Analysis of factors affecting water level recovery data
N79-27621
Suppression of scattered light
N79-27973
ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, ABERDEEN PROVING GROUND, MD.
Response of a rocket motor to transverse blast loading
[AD-A068464] N79-27239
Search for low-lying triplet electronic states
[AD-A068465] N79-28028
ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, DOVER, N. J.
Two-photon reradiation from laser protective materials
[AD-A068466] N79-27497
ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND, CLEVELAND, OHIO.
Performance of two-stage fan having low-aspect-ratio first-stage rotor blading
[NASA-TP-1493] N79-27143
ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND, MOFFETT FIELD, CALIF.
Earth winds, flow quality, and the minimum-protection inlet treatment for the NASA Ames 80- by 120-foot wind tunnel nonreturn circuit
[NASA-TM-78600] N79-27186
ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND, ST. LOUIS, MO.
RAM projections for aircraft rotor blades
[AD-A068822] N79-27130
ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N. H.
Electrical group impedance measurements in the United States between 200 and 415 kHz
[AD-A068088] N79-27352
Computer modeling of atmospheric ice accretion
[AD-A068582] N79-27785
ARMY ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND, FORT MONMOUTH, N. J.
Static and dynamic frequency: Temperature characteristics of quartz vibrators
[AD-A068630] N79-27409
ARMY MISSILE RESEARCH AND DEVELOPMENT COMMAND, REDSTONE ARSENAL, ALA.
Pershing 2 alternate altimeter replacement scheme
[AD-A068168] N79-27483
Acoustical speckle interferometry
[AD-A067664] N79-27935
ARMY RESEARCH AND TECHNOLOGY LABS., MOFFETT FIELD, CALIF.
Wind tunnel tests of four flexible wing ultralight gliders
N79-27084
ARNOLD ENGINEERING DEVELOPMENT CENTER, ARNOLD AIR FORCE STATION, TENN.
A new facility for structural engine testing
N79-27173
ARO, INC., ARNOLD AIR FORCE STATION, TENN.
Calculation of skin friction in two-dimensional, transonic, turbulent flow
[AD-A067423] N79-27102
Aeropropulsion systems test facility rake calibration test in tunnel A
[AD-A068975] N79-27189
Evaluation of a self-calibrating silicon bolometer
[AD-A068083] N79-27484
ASHLAND OIL AND REFINING CO., KY.
The H-Coal processes: A status report
N79-27617
ASTRO RESEARCH CORP., CARPINTERIA, CALIF.
Study of membrane reflector technology
[NASA-CR-158729] N79-27655
ATLANTIC RICHFIELD CO., HARVEY, ILL.
Energy supply and demand in California
N79-27603
ATMOSPHERIC ENVIRONMENT SERVICE, DOWNSVIEW (ONTARIO).
Modelling the effect of separated wakes behind hills and buildings on pollutant dispersion
N79-27549
A numerical model of flow above gentle topography with changes in surface roughness
N79-27550
Measurements of dispersion coefficients in cold environment
N79-27560
Experiments with a Markov chain dispersion model applied to vertical dispersion in the surface layer
N79-27569
ATMOSPHERIC SCIENCES LAB., WHITE SANDS MISSILE RANGE, N. MEX.
Engineering flight tests of range meteorological sounding system radiosonde
[AD-A067430] N79-27200
Response characteristics of Knollenberg light-scattering aerosol counters
[AD-A067701] N79-27750
The 19702A GSRS missle number 10, round number, B-1, 6 February 1979
[AD-A067676] N79-27777
The 12824C lance, missile number 4661, round number 324 NPL
[AD-A067761] N79-27778
The 12831D Lance missile number 3306, round number 323, ESL
[AD-A067687] N79-27779
The 19303 GSRS. Missile number 1013, round number V-13,
[AD-A067686] N79-27780
ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON (ENGLAND).
Zero and superpressure free flight ballooning
[AWRE-0-61/78] N79-27111
ATOMICS INTERNATIONAL, CANOGA PARK, CALIF.
Manual for the Solar Total Energy System Evaluation Program
[SAND-78-7045] N79-27682
AVCO LYCOMING DIV., STRATFORD, CONN.
Structural analysis of a gas turbine impeller using finite-element and holographic techniques
N79-27149
AVIONS MARCEL DASSAULT-BREGUET AVIATION, SAINT-CLOUD (FRANCE).
Determining the dynamic response due to an imbalance at the attachments of a motor on a pod
N79-27171
AXIOMATIX, LOS ANGELES, CALIF.
Orbiter C1U/IUS communications hardware evaluation
[NASA-CR-160271] N79-27349

B

BATTELLE COLUMBUS LABS., OHIO.
Steam turbine rotor reliability: Task details
[EPRI-NP-923] N79-27520
Using coal inside California for nonelectric applications
N79-27599
BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Investigation of gasification of biomass in the presence of catalysts
[CONF-7809125-1] N79-27327
Sampling and analysis methods for geothermal fluids and gases
[PNL-MA-572-APP] N79-27679
Statistical nature of cold fronts within the Gulf of Mexico and their potential influence on OTEC operations
[PNL-2878] N79-27786
Study of a method for filtering optical images
[BNWL-TR-343] N79-27979
Study of a method for filtering optical images
[BNWL-TR-342] N79-27980
BAYERISCHE AKADEMIE DER WISSENSCHAFTEN, MUNICH (WEST GERMANY).
Adjustment of large geodetic networks using a method for general sparse matrices
[SER-A-87] N79-27760
BDM CORP., ALBUQUERQUE, N. MEX.
Design guidelines for large photovoltaic arrays
[SAND-79-7001] N79-27698
BDM CORP., MCLEAN, VA.
Federal photovoltaic utilization program. Planning resource document
[HCP/M50081-01] N79-27706
BEAK CONSULTANTS LTD., TORONTO (ONTARIO).
Stability sensitivity of the climatological dispersion model: A practical examination
N79-27588
BECHTEL NATIONAL, INC., SAN FRANCISCO, CALIF.
Coal energy conversion options for Navy bases
[AD-A067463] N79-27667
BELL TELEPHONE LABS., INC., MURRAY HILL, N. J.
Muon spin rotation (muon SR)
[BNL-25216] N79-27946
BIONETICS CORP., HAMPTON, VA.
Carbon fiber behavior in an enclosed volume
[NASA-CR-159076] N79-27718
BITUMINOUS COAL RESEARCH, INC., MONROEVILLE, PA.
Coal supply for California
N79-27607
BLACK AND VEATCH CONSULTING ENGINEERS, KANSAS CITY, MO.
Geologic assessment of compressed air storage sites in Kansas
[EPRI-EM-877] N79-27689
BOEING CO., SEATTLE, WASH.
Engine/aircraft structural integration: An overview
N79-27167
BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
The ultralight sailplane
N79-27080
BOSTON UNIV., MASS.
Compilation and analysis of data sets for the evaluation of regional sulfate models
N79-27579
Mossbauer study of Y(Fe(0.022)Co(0.978)2) from 259K to 0.18K using a stochastic model of magnetic ordering
N79-28014
BRAUN (C. F.) AND CO., ALHAMBRA, CALIF.
Coal gasification, commercial concepts, gas cost guidelines, revision 1
[FE-2240-100] N79-27331
BRIGHAM YOUNG UNIV., PROVO, UTAH.
Mixing and kinetic processes in pulverized coal combustors
[EPRI-FP-806-SY] N79-27330
BRITISH AEROSPACE AIRCRAFT GROUP, PRESTON (ENGLAND).
Integration of an airframe with a turbofan and afterburner system
N79-27172
BRITISH AEROSPACE DYNAMICS GROUP, BRISTOL (ENGLAND).
Study of a flexible solar array generator for a remote sensing satellite. Volume 1: Technical report
[ESS/SS-909-VOL-1] N79-27709
A phase study of a grazing incidence solar telescope. Volume 1: Executive summary
[ESS/SS-814-VOL-1] N79-28082
GRIST: A study of a grazing incidence solar telescope. Volume 2: Technical report
[ESS/SS-814-VOL-2] N79-28083
BRITISH AIRCRAFT CORP., FILTON (ENGLAND).
Thrust vector control
N79-27206
Spoiler controls
N79-27207
Missile configuration design options
N79-27208
Base drag
N79-27209
High incidence aerodynamics
N79-27210
BRITISH LEYLAND MOTOR CORP., ALLESLEY (ENGLAND).
The application of a mathematical model to the estimation of the concentrations of pollutants in European cities
N79-27586
BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
A comparative study of diffusion classification by lapse rate, gustiness and a modified Pasquill method
N79-27557
Comprehensive areal model of residential heating demands
[BNL-24998] N79-27692
Impacts of new energy technologies as measured against reference energy systems
[BNL-25475] N79-27694
Locational response to regulatory policy: A regional analysis of energy facility location
[BNL-23597] N79-27695
Sulfur and nitrogen compounds in urban aerosols
[BNL-25223] N79-27723
Alternative, semi-automated method for performing multiobjective analyses
[BNL-50892] N79-27921
Review of neutrino physics at Brookhaven
[BNL-25378] N79-27948
BROWN, BOVERI UND CIE, A.G., LAMPERTHEIM (WEST GERMANY).
Pressure contact use on high-power semiconductor devices free of thermal fatigue
[BMFT-FB-T-78-02] N79-27418

C

CALGARY UNIV. (ALBERTA).
Field investigations of the dispersion of pollution across a ridge
N79-27548
CALIFORNIA ENERGY COMMISSION, SACRAMENTO.
Electric energy demand and supply prospects for California
N79-27601
CALIFORNIA INST. OF TECH., PASADENA.
Oxy anion-accelerated rearrangements
N79-27260
Gravitational radiation and the ultimate speed in Rosen's Bimetric theory of gravity
[NASA-CR-158718] N79-27743
Time-dependent gravity in southern California, May 1974 - Apr 1979
[NASA-CR-158765] N79-27807
CALIFORNIA SPACE SHUTTLE TASK FORCE.
Air quality as a constraint to the use of coal in California
N79-27605
CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO.
Water as a constraint to the use of coal for California
N79-27606

CALIFORNIA UNIV., BERKELEY.
Thermal rate constants, energy dependence and isotope effect for laser initiated halogen-hydrogenhalide reactions
N79-27253
The calculation of autoionization positions and widths with applications to penning ionization reactions
N79-27254
The oxidizing behavior of some platinum metal fluorides
N79-27261
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
N79-27264
Laser photochemical reaction dynamics in formaldehyde
N79-27274
Electromagnetic scattering by two-dimensional inhomogeneity due to an oscillating magnetic dipole
N79-27346
Studies of discharge excited organic vapors for efficient laser emission
[AD-A067512] N79-27495
The directional stability of crack propagation
N79-27530
Wind mixing in lakes
N79-27625
Algal growth kinetics in bioconversion of solar energy
N79-27650
Some analytic models of passive solar building performance: A theoretical approach to the design of energy-conserving buildings
N79-27651
Wave propagation in anelastic media with applications to seismology
N79-27734
Studies in modeling, reduction and filtering of potential field data
N79-27737
Chemical interaction of aqueous solutions with epidote-feldspar mineral assemblages in geologic systems
N79-27741
Referenced magnetotelluric with SQUIDS
N79-27742
Evaluation of three constitutive models for soils
[AD-A068222] N79-27755
Biological effects of laser irradiation on nerve cells
N79-27840
A study of sampling schemes for Fourier transform reconstruction with an error analysis
N79-27892
A survey of some recent mathematical results in atomic and molecular quantum mechanics
N79-27938
Temperature measurements in the TORMAC 4-C plasma
N79-27993
Density and magnetic field measurements in the Tormac IV-c plasma
N79-27995
Energy transfer in anisotropic systems. A: Exciton migration in substitutionally disordered one-dimensional solids. B: The spectroscopy of molecules adsorbed on metal surfaces
N79-28010
Catalysis by platinum single crystal surfaces: Low pressure hydrocarbon reactions and the effects of introducing strongly bound oxygen at the surface
N79-28012
Thermodynamic analysis of equilibrium phase relations among minerals and aqueous solutions in metasomatic processes
N79-28033
Molecular thermodynamics of vapor-liquid and liquid-liquid equilibra
N79-28036
An interferometric and multi-transitional study of the Orion methanol masers
N79-28070
Photometry of a complete sample of faint galaxies
N79-28071
Gauge invariant perturbation theory in spatially homogeneous cosmology
N79-28086
I-Xe dating of silicate and troilite from IAB iron meteorites
N79-28095
The nuclear and atomic physics governing changes in the composition of relativistic cosmic rays
N79-28112
Measurement of the isotopic composition of the iron group elements in the galactic cosmic radiation
N79-28113

CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
High-resolution EPR and piezospectroscopy studies of the lithium-oxygen donor in germanium
[LBL-8429] N79-27283
Studies of prototype high-gain micro-channel plate photomultipliers
[LBL-7957] N79-27410
Crossed laser and molecular beam study of multiphoton dissociation of C2F5Cl
[LBL-8090] N79-27498
Modeling passive solar buildings with hand calculations
[LBL-8583] N79-27683
Acoustic emission sources in brittle solids
[LBL-8335] N79-27937
Hydrogen in germanium
[LBL-7996] N79-28030

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Objective wind field pattern characterization
N79-27570
Mass-consistent wind field modeling: Finite difference vis-a-vis finite element
N79-27571
Prelimary results of tests of proprietary chemical additives, seeding, and other approaches for the reduction of scale in hypersaline geothermal systems
[UCID-18051] N79-27669
LLL Octopus network: Some lessons and future directions
[UCRL-81067] N79-27885
Probabilistic safety analysis for solidified high-level nuclear waste management systems
[NUREG-CR-0577] N79-27962

CALIFORNIA UNIV., LOS ANGELES.
Kinetics and magnetic field effects on laser induced fluorescence in NO2
N79-27256
A large scale wind energy program for the state of California
N79-27648
Theoretical and experimental analysis of alkaline zinc batteries
[AD-A067514] N79-27666
Non-finitely based binary algebras derived from lattices
N79-27891
Hardy classes on Riemann surfaces
N79-27923
High beta plasmas in toroidal Surmacs
N79-27991

CALIFORNIA UNIV., SAN DIEGO.
Laboratory analogues to cosmic dust
N79-27275
Physical processes in positron scattering at metal surfaces
N79-28021

CALIFORNIA UNIV., SAN FRANCISCO.
Functional connections of the central auditory nervous system: Thalamocortical corticothalamic and corticotectal connections of the AI, AII and AAF auditory cortical fields
N79-27839

CALIFORNIA UNIV., SANTA BARBARA.
Exchange perturbation theories applied to electron-hydrogen atom scattering
N79-27942

CALSPAN ADVANCED TECHNOLOGY CENTER, BUFFALO, N. Y.
Effects of control system dynamics on fighter approach and landing longitudinal flying qualities, volume 1
[AD-A067550] N79-27183

CAMBRIDGE UNIV. [ENGLAND].
Fracture mechanisms in fibrous composites
[AD-A067965] N79-27247
Unsteady flows
N79-27431
Unsteady flow in turbomachines
N79-27432

CARBORUNDUM CO., NIAGARA FALLS, N. Y.
High temperature properties of sintered alpha silicon carbide
[CONF-7810129-2] N79-27251

CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
A study of the ordering and strengthening mechanisms in an off-stoichiometric Ni-Mo alloy
N79-27292

CENTER FOR NAVAL ANALYSES, ARLINGTON, VA.
A secretary problem with a random number of choices
[AD-A068186] N79-27902

CENTRAL ELECTRICITY GENERATING BOARD, LONDON [ENGLAND].
Eddy current probe gun
[TDB-312] N79-27416

CENTRE D'ESSAIS DES PROPULSEURS, ORSAY [FRANCE].
The integrity of aircraft jet engines under the impact of foreign bodies
N79-27174

CENTRE D'ETUDE DE L'ENERGIE NUCLEAIRE, MOL [BELGIUM].
Influence of the turbulence typing scheme upon the yearly average concentrations by means of a bi-Gaussian model
N79-27555

CENTRE NATIONAL POUR L'EXPLOITATION DES OCEANS, PARIS [FRANCE].
Remote sensing of hydrocarbon pollution
N79-27725

CENTRE OCEANOLOGIQUE DE BRETAGNE, BREST [FRANCE].
Amoco Cadiz: Preliminary observations of the oil spill impact on the marine environment
[CNEXO-6-1978] N79-27726
The Sea-Beam: A multi-beam echo-sounder installed on the oceanographic ship 'Jean Charcot'
[CNEXO-STR-37] N79-27810

CENTRE TECHNIQUE DES INDUSTRIES MECANIQUES, ST. DENIS [FRANCE].
Experimental study of bonding agents used in mechanical assemblies
[CETIM-1-2J-03-0] N79-27316
Collected practical data on fatigue life research. On the interpretation of fatigue tests under combined constraints
[CETIM-1-1D-01-0] N79-27540
On the calculation of yield strength for various assemblies
[CETIM-1-1G-06-0] N79-27541

CHALMERS UNIV. OF TECHNOLOGY, GOTEBORG [SWEDEN].
The third millenium roots of Babylonian mathematics. Part 1: A method for the decipherment, through mathematical and metrological analysis, of Proto-Sumerian and Proto-Elamite semi-pictograph inscriptions
[CTH-MATH-1978-9] N79-27910
On rational approximations of groups of operators
[CTH-MATH-1978-10-1] N79-27911
On the Gaussian measure of symmetric convex sets
[CTH-MATH-1978-10-2] N79-27927
Space and time solution for two coupled intensity deviations from a stationary nonlinear state
N79-28004

CITY UNIV., LONDON [ENGLAND].
The human micro-environment
N79-27851

CIVIL AERONAUTICS BOARD, WASHINGTON, D.C.
Civil Aeronautics Board reports to Congress, fiscal year 1977 and transitional quarter
N79-27069

CLARK UNIV., WORCESTER, MASS.
Short term sediment movements and related channel charges: The Piceance Basin, Colorado
N79-27622

COLOGNE UNIV. [WEST GERMANY].
The transfer of electromagnetic radiation in the turbulent atmosphere
N79-27389
Solar radiation absorption studies in the atmosphere and ocean using a two stream method
[MITT-25] N79-27620

COLORADO SCHOOL OF MINES, GOLDEN.
Enthalpy measurement of coal-derived liquids
[FE-2035-12] N79-27282
Kinetics of coal liquefaction to preasphaltenes, asphaltenes and oils
N79-27320

COLORADO STATE UNIV., FORT COLLINS.
A detailed parameterization of the atmospheric boundary layer
N79-27731
Numerical simulation of VTPR temperature retrievals in a severe storm environment
[NASA-CR-158761] N79-27770
Optimum interpolation of radiosonde and satellite-derived temperature fields
[PB-293017/0] N79-27798

COLUMBIA UNIV., NEW YORK.
Shape of the ocean surface and implications for the Earth's interior
N79-27804
Propagation of fermions in [A sub 0]=0 gauge
N79-27957
A study of the molecular complexes accompanying MON OB1 MON OB2 and CMA OB1
N79-28068

COMMISSION OF THE EUROPEAN COMMUNITIES, BRUSSELS [BELGIUM].
Some remarks on the noise nuisances and the basis for future ECC regulations
N79-27513
The comparison and coordination of national policies and programs in the energy research and development sector
[EUR-5911] N79-27653

COMMITTEE ON APPROPRIATIONS [U. S. SENATE].
Alcohol fuels
[GPO-22-334] N79-27322
Department of Housing and Urban Development, independent agencies appropriation bill, 1980
[S-REPT-96-258] N79-28057

COMMITTEE ON GOVERNMENT OPERATIONS [U. S. HOUSE].
Federal Information Centers Act
[H-REPT-95-1530] N79-28049

COMMONWEALTH EDISON CO., CHICAGO, ILL.
Air monitoring network design for power plant siting
N79-27590

COMMUNICATIONS RESEARCH CENTRE, OTTAWA [ONTARIO].
Terrain and ionospheric effects on ELT transmissions to a SARSAT spacecraft
[CRC-1324] N79-27354
The apparent noise temperature of the earth as seen by a SARSAT spacecraft receiving antenna
[CRC-1323] N79-27355
COMPUTER SCIENCES CORP., HOUSTON, TEX.
Preliminary trend monitoring system data manager's guide
[NASA-CR-160251] N79-27232
Drive program documentation
[NASA-CR-160252] N79-27233
COMPUTER SCIENCES CORP., SAN DIEGO, CALIF.
HF channel simulator for wideband signals deviative absorption and groundwave attenuation in the HF channel, addendum 1
[AD-A067906] N79-27359
CONNECTICUT UNIV., STORRS.
The synthesis of some biodegradable polymers N79-27300
The molecular morphology of polyethylene via nuclear magnetic resonance N79-27301
Documentation of a ground hydrology parameterization for use in the GISS atmospheric general circulation model
[NASA-CR-158766] N79-27632
CORNING GLASS WORKS, N.Y.
A Monte Carlo approach to competition strategy N79-27075
CREARE, INC., HANOVER, N.H.
Design, development, and test of a laser velocimeter for a small 8:1 pressure ratio centrifugal compressor
[NASA-CR-134781] N79-27478

D

DAMES AND MOORE, ATLANTA, GA.
Receptor grid selection in model evaluation studies to compensate for uncertainty in wind direction specification N79-27592
DAMES AND MOORE, WHITE PLAINS, N. Y.
Technical support for GEIS: Radioactive waste isolation in geologic formations. Volume 20: Thermomechanical stress analysis and development of thermal loading guidelines
[Y/OWI/TM-36/20] N79-27967
DANISH METEOROLOGICAL INST., COPENHAGEN.
Oceanographical observations from Danish lightvessels and coastal stations
[ISBN-87-7478-151-0] N79-27809
DAYTON UNIV. RESEARCH INST., OHIO.
Impact damage on titanium leading edges from small hard objects
[AD-A068458] N79-27293
DENVER UNIV., COLO.
The loudness of tinnitus N79-27837
DEPARTMENT OF ENERGY, BARTLESVILLE, OKLA.
Apparatus for rapid and precise surface area measurements of unconsolidated geologic materials
[BETC/RI-78/8] N79-27756
Enthalpy of combustion of RJ-6
[AD-A067968] N79-28037
DEPARTMENT OF ENERGY, PITTSBURGH, PA.
Stability of coal-oil mixtures
[CONF-7805152-1] N79-27332
DEPARTMENT OF ENERGY, WASHINGTON, D. C.
Findings and views concerning the exemption of aviation gasoline from the mandatory petroleum allocation and price regulations
[DOE/ERA-0024] N79-27336
The 1980 motor gasoline supply and demand. Analysis memorandum AM/ES/79-12
[DOE/EIA-0102/32] N79-27337
Diesel organic rankine cycle compound engine [Bottoming Cycle] program plan
[DOE/CS-0052] N79-27521
Re-examination of undiscovered oil resources in the United States
[DOE/EIA-0103/9] N79-27643
Underground storage of natural gas by interstate pipeline companies for 1976 and winter 1976 - 1977
[DOE/EIA-0151] N79-27684
Environmental readiness document. Small scale low head hydro: Commercialization, phase 3 planning
[DOE/ERD-0009] N79-27686
Solar energy for agricultural and industrial process heat
[DOE/CS-0053] N79-27688
Environmental readiness document. Solar: Hot water and passive, commercialization phase 3 planning
[DOE/ERD-0010] N79-27690
DOE program for improvement practices for shallow burial of radioactive waste
[CONF-781109-25] N79-27958
Findings and views concerning the exemption of kerojet fuels from the mandatory petroleum allocation and price regulations
[DOE/ERA-0023] N79-28058
Midterm oil and gas supply modeling system methodology description
[DOE/EIA-0103/17] N79-28059
DEPARTMENT OF TRANSPORTATION, WASHINGTON, D. C.
Discrete Address Beacon System [DABS] Air Traffic Control Radar Beacon System [ATCRBS] interference analysis
[AD-A068565] N79-27119
DETROIT DIESEL ALLISON, INDIANAPOLIS, IND.
The unsteady aerodynamics of a cascade in translation N79-27180
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, COLOGNE [WEST GERMANY].
Unsteady rotor blade loading in an axial compressor with steady-state inlet distortions N79-27176
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, STUTTGART [WEST GERMANY].
Advanced composites in sailplane structures: Applications and mechanical properties N79-27079
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, WESSELING [WEST GERMANY].
Missile guidance techniques N79-27230
DORNIER-SYSTEM G.M.B.H., FRIEDRICHSHAFEN [WEST GERMANY].
Flight test of four ESTEC heat pipes as a part of the payload planner for launch on an ARIES rocket
[ESA-CR[P]-1146] N79-27222
Design, manufacturing, and testing of spacecraft thrust cone made of Carbon Fiber Reinforced Plastic [CFRP]
[EMSB-79/78] N79-27240
DOUGLAS AIRCRAFT CO., INC., LONG BEACH, CALIF.
Cargo Logistics Airlift Systems Study [CLASS]. Volume 3: Cross impact between the 1990 market and the air physical distribution systems, book 1
[NASA-CR-158914] N79-27112
The 1990 system characteristics and requirements N79-27113
Airfreight forecasting methodology and results N79-27114
The 1990 direct support infrastructure N79-27115
Aircraft and avionic related research required to develop an effective high-speed runway exit system
[NASA-CR-159075] N79-27185
DU PONT DE NEMOURS [E. I.] AND CO., AIKEN, S. C.
Viscosity and electrical conductivity of glass melts as a function of waste composition
[DP-MS-78-80] N79-27314
Analysis of 1st and 2nd moments of the concentration distribution for near ground releases of tracers in the atmosphere N79-27559
Geohydrologic investigations of buried metamorphic rock and mudstone for the storage of radioactive waste
[DP-MS-79-13] N79-27961
Waste management
[DPST-78-125-2] N79-27964
Development of glass compositions for immobilization of SRP waste
[DP-1517] N79-27965
DU PONT DE NEMOURS [E. I.] AND CO., WILMINGTON, DEL.
Validation of CRSTER model air quality estimates for an industrial plant N79-27583
DUKE UNIV., DURHAM, N. C.
A systematic approach to open tubular column gas-chromatographic instrumentation N79-27271
A dc model for power switching transistors suitable for computer-aided design and analysis
[NASA-CR-158764] N79-27396

E

ECOLE POLYTECHNIQUE, PARIS [FRANCE].
A review on fundamentals of acoustic wave theory and noise generation N79-27510
Noise from industrial fans N79-27511
General introductory remarks. A: Noise from fluid ejectors. B: Pressure fluctuations generated in a circuit by flow singularities. C: Use of correlation technique to noise source detection problem N79-27512
ELECTRIC POWER RESEARCH INST., PALO ALTO, CALIF.
Status of NO sub x control for coal-fired power plants N79-27609
ELECTRICITE DE FRANCE, PARIS.
Bibliographical study of electrocatalysis involving mixed oxide compounds in an alkaline medium
[P/539/77/20] N79-27284
Thermoplastic materials corrosion in 40% KOH [120 C - 180 C]
[P/539/77/26] N79-27315
Effect of silicate ions on electrode overvoltage
[P/539/77/24] N79-27413
ELRICK AND LAVIDGE, INC., SAN FRANCISCO, CALIF.
Commercialization focus group interview: Electric/hybrid vehicles
[DOE/TIC-10008] N79-28064
ENERGY TRANSPORTATION SYSTEMS, INC., SAN FRANCISCO, CALIF.
Prospects for coal slurry pipelines in California N79-27608
ENGINEERING SCIENCES DATA UNIT, LONDON [ENGLAND].
Bolted Joint Fatigue Programme. Volume 1: Stage 1, sections 1 to 6
[S/T-MEMO-1/77-VOL-1] N79-27536
Bolted Joint Fatigue Programme. Volume 2: Stage 1, appendices A, B, and C
[S/T-MEMO-1/77-VOL-2] N79-27537
Bolted Joint Fatigue Programme. Volume 3: Stage 2, supplementary investigations 1 to 6
[S/T-MEMO-1/77-VOL-3] N79-27538
Bolted Joint Fatigue programme. Volume 4: Stage 2, supplementary investigations 7 to 9
[S/T-MEMO-1/77-VOL-4] N79-27539
ENTE NAZIONAL PER L'ENERGIA ELETTRICA, MILAN [ITALY].
Results of SF6 tracer diffusion experiments next to a power plant N79-27565
ENVIRONMENT CANADA, HALIFAX [NOVA SCOTIA].
Tests of the climatological dispersion model and Gaussian Models at the Strait of Canso and at Lingan, Nova Scotia N79-27584
ENVIRONMENTAL MONITORING AND SUPPORT LAB., LAS VEGAS, NEV.
Energy-related air quality monitoring in the western energy resource development area
[PB-293160/8] N79-27730
ENVIRONMENTAL PROTECTION AGENCY, CHICAGO, ILL.
The ratio of peak 1-hour average concentrations to peak concentrations of other averaging times for various pollutants and differing sources N79-27582
ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.
Use of wind fluctuation statistics to estimate dispersion near roadways N79-27558
Turbulent structure of the urban surface boundary layer N79-27561
ENVIRONMENTAL RESEARCH AND TECHNOLOGY, INC., SANTA BARBARA, CALIF.
Regional transport and photochemical model of atmospheric sulfates N79-27575
ETA ENGINEERING, INC., WESTMONT, ILL.
Air monitoring network design for power plant siting N79-27590
EUROPEAN SOUTHERN OBSERVATORY, MUNICH [WEST GERMANY].
European sponsored astronomical research activities
[AR-1977] N79-28080
EUROPEAN SPACE TECHNOLOGY CENTER, NOORDWIJK [NETHERLANDS].
Heat pipe qualification requirements
[ESA-PSS-49/TST-01-ESTEC] N79-27471
The prototype low-energy telescope system for the international solar COSPIN experiment
[ESA-STR-202] N79-27989
EXXON RESEARCH AND ENGINEERING CO., FLORHAM PARK, N. J.
EXXON donor solvent coal liquefaction process N79-27618

F

FEEMAS [ITALY].
Mathematical micromodel for local diffusion of carbon monoxide from motor vehicles N79-27587

FERMI NATIONAL ACCELERATOR LAB., BATAVIA, ILL.
Quantum mechanics and quarkonium: An introductory review
[FERMILAB-CONF-78/82-THY] N79-28039
FIAT AVIAZIONE S.P.A., TURIN [ITALY].
Some theoretical and experimental investigations of stresses and vibrations in a radial flow rotor
N79-27158
FINNISH METEOROLOGICAL INST., HELSINKI.
On the diurnal variation of wind in Finland
[TR-17] N79-27769
FLORIDA SOLAR ENERGY CENTER, CAPE CANAVERAL.
Thermal performance evaluation of the Semco [liquid] solar collector
[NASA-CR-161230] N79-27656
FLOW RESEARCH, INC., KENT, WASH.
Numerical evaluation of transonic equivalence rule
[AD-A067902] N79-27101
Physical modeling of plume dispersion in complex terrain: Neutral and stable atmosphere
N79-27544
FLUOR ENGINEERS AND CONSTRUCTORS, INC., IRVINE, CALIF.
A systems examination of the opportunities of coal for California
N79-27600
FOM-INSTITUUT VOOR PLASMAFYSICA, JUTPHAAS [NETHERLANDS].
Proposal for a modification of SPICA
[REPT-78-112] N79-28006
FONDAZIONE UGO BORDONI, ROME [ITALY].
Theory and experiments on precision L-band DMF
[FUB-44-1977] N79-27124
Optical treatment of information
[FUB-17-1977] N79-27374
Computation of attenuation and phase shift per unit length due to spherical rain drops
[FUB-24-1977] N79-27375
Calculation of the attenuation as a function of rainfall intensity for several polarizations
[FUB-43-1977] N79-27382
Indicial response invariance in discrete time variable systems
[FUB-42-1977] N79-27912
Calculation of functions of some particular matrices
[FUB-11-1977] N79-27926
Measurement of optical fibers attenuation by the reflectometric method: Experimental apparatus and attainable accuracy
[FUB-16-1977] N79-27985
Characteristics of low loss optical fibers obtained from commercially available dielectrics
[FUB-21-1977] N79-27986
Measurements of characteristic parameters of an optical fiber
[FUB-22-1977] N79-27987
Analysis of costs and benefits in automated information systems
[FUB-45-1977] N79-28055
FORM AND SUBSTANCE, INC., WESTLAKE VILLAGE, CALIF.
Verification of the MADCAP model of photochemical air pollution in the San Diego air basin
N79-27573
Point source air pollution modeling
N79-27574
FORSCHUNGSGRUPPE FUER INFORMATIONSVERARBEITUNG UND MUSTERERKENNUNG, KARLSRUHE [WEST GERMANY].
Study of real-time converter of an incoherent image into a transparency: Optical to optical converter/technology study
[ESA-CR[P]-1155] N79-27988
FORSCHUNGSINSTITUT FUER ANTHROPOTECHNIK, MECKENHEIM [WEST GERMANY].
Decision making and problem solving with computer assistance
[FB-36] N79-28048
FORSCHUNGSINSTITUT FUER FUNK UND MATHEMATIK, WERTHOVEN [WEST GERMANY].
The error distribution for monopulse direction finding involving several sources
[FFM-267] N79-27123
Computer controlled near field measurements for testing steerable array antennas
[FFM-263] N79-27372
Formation tracking, part 1: Basic theory and formation track initiation
[FFM-265] N79-27373
SBIBLI: A data base system for bibliographic references
[FFM-264] N79-28052
FORSCHUNGSINSTITUT FUER HOCHFREQUENZPHYSIK, WERTHHOVEN [WEST GERMANY].
ECCM: Performance of radar signal design
[REPT-5-78] N79-27370
Correlation of narrow band receiver signals with reflection interference of the incident wave field
[REPT-6-78] N79-27371
Spectral analysis using the Karhunen-Loeve transform
[REPT-7-78] N79-27922

G

GENERAL DYNAMICS/CONVAIR, SAN DIEGO, CALIF.
Atlas 5013 tank corrosion test
[NASA-CR-158760] N79-27234
GENERAL DYNAMICS/POMONA, CALIF.
Foam-filled fiberglass radomes
[AD-A068672] N79-27249
GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Aircraft engine design using experimental stress analysis techniques
N79-27151
GENERAL ELECTRIC CO., EVENDALE, OHIO.
Analysis, design, and test of acoustic treatment in a laboratory inlet duct
[NASA-CR-3161] N79-27934
GENERAL ELECTRIC CO., PHILADELPHIA, PA.
Hypersonic boundary layers
N79-27441
Downstream laminar boundary layer with mass additions
N79-27442
Boundary layer transition
N79-27443
Hypersonic turbulent boundary layers without mass addition
N79-27444
Hypersonic turbulent boundary layers with mass addition
N79-27445
Roughness phenomena in turbulent flow
N79-27446
Analysis of charring ablators
N79-27447
GENERAL ELECTRIC CO., PITTSFIELD, MASS.
Three-phase UHV ac transmission research
[EPRI-EL-823] N79-27411
GENERAL RESEARCH CORP., MCLEAN, VA.
Earth-to-orbit reusable launch vehicles: A comparative assessment
[NASA-CR-157444] N79-27192
GENEVA OBSERVATORY [SWITZERLAND].
Catalogue of 'strict 0.01 mag photometric star boxes'
[PUBL-SER-B-FASC-2] N79-28081
GEORGE WASHINGTON UNIV., WASHINGTON, D. C.
Maximum entropy spectral analysis in the spatial domain
[AD-A068558] N79-27364
GEORGIA INST. OF TECH., ATLANTA.
Research in millimeter wave techniques
[NASA-CR-158785] N79-27350
GIBBS AND COX, INC., WASHINGTON, D. C.
Ocean Thermal Energy Conversion [OTEC] platform configuration and integration. Volume 2: Conceptual design
[DOE/ET/4064-1-VOL-2] N79-27697
GRONINGEN RIJKSUNIVERSITEIT [NETHERLANDS].
The solution of Navier-Stokes equations in the boundary layer
N79-27455
Computation of potential flow around bodies
N79-27456
GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
The computation of optimal aircraft trajectories
[RE-577] N79-27128
Design improvements simplify remote maintenance of tokamaks
[CONF-781105-86] N79-28003
GULF MINERAL RESOURCES CO., DENVER, COLO.
Status report the SRC-1 and SRC-2 processes
N79-27616

H

HAMBURG UNIV. [WEST GERMANY].
Recent developments in the numerical treatment of partial differential equations
N79-27457
HAMILTON STANDARD, WINDSOR LOCKS, CONN.
Methane production from beef cattle feedlots
[CONF-7806107-2] N79-27333
HARRIS CORP., MELBOURNE, FLA.
Application of a correlation discriminant operator to perturbational adaptive algorithms
[AD-A068890] N79-27362
Human read - machine read microfilm mass memory system
[AD-A068892] N79-28051
HARRY DIAMOND LABS., ADELPHI, MD.
Analysis of wind tunnel test results of fluidic generator for high-altitude rocket
[AD-A069172] N79-27219
Design considerations for improved fluidic input servovalve performance
[AD-A068977] N79-27517
HARVARD UNIV., CAMBRIDGE, MASS.
Study of mathematical models of mutation and selection in multi-locus systems
[COO-2472-04] N79-27908
HAWAII UNIV., HONOLULU.
Mars section of remote sensing of basalts in the solar system. Chapter 2 of basaltic volcanism in the solar system
[RSL-221] N79-28097
HEALTH EDUCATION AUTHORITY OF LOUISIANA, NEW ORLEANS.
Grip-connected integrated community energy system. Phase 2: Detailed feasibility and preliminary design, stage 2
[COO-4337-2/2] N79-27701
HOKKAIDO UNIV., SAPPORO [JAPAN].
On a calendar-time oriented systematic sampling plan in air quality monitoring
N79-27594
HOUSTON UNIV., TEX.
A modification of the likelihood equations for normal classes with field structure, preliminary report
[NASA-CR-160266] N79-27894
HUGHES RESEARCH LABS., MALIBU, CALIF.
Crossed-field closing switch development
[AD-A068185] N79-27407

I

IBM FEDERAL SYSTEMS DIV., OWEGO, N. Y.
Electrical characterization of 16K dynamic rams
[AD-A067713] N79-27867
IBM WATSON RESEARCH CENTER, YORKTOWN HEIGHTS, N.Y.
Topics in mathematical programming. Research in nondifferentiable and discrete optimization
[AD-A067554] N79-27879
ILLINOIS INST. OF TECH., CHICAGO.
Displacement and strain measurement using focused image holography
N79-27528
Air monitoring network design for power plant siting
N79-27590
ILLINOIS STATE WATER SURVEY, URBANA.
Solar energy information and data for Illinois
[PB-292712/7] N79-27800
ILLINOIS UNIV. AT CHICAGO CIRCLE, CHICAGO.
A vibrational bias mechanism for diatomic dissociation: Induction times, steady rates, and activation energies
N79-27255
Refinement and validation of a mathematical model of the human torso
N79-27841
Characterization of cardiovascular function by automated monitoring of cardiac contractility and left ventricular wall motion activity
N79-27842
Stability of the coincidence set for the Signorini problem
N79-27889
ILLINOIS UNIV. AT URBANA-CHAMPAIGN.
Intervalence electron transfer in mixed-valence compounds
N79-27262
Magnetic exchange interactions in copper[II] complexes propagated by extended bridging groups
N79-27263
Chemiluminescence of dimethyldioxetane: Unimolecular generation of excited singlet and triplet acetone. Chemically initiated electron-exchange luminescence, the primary light generating reaction
[AD-A068920] N79-27281
Numerical and software requirements for general nonlinear finite element analysis
N79-27527
Mineralogy and chemistry of some unusual clay deposits in the Amargosa Desert, southern Nevada
N79-27623
Oxygen and hydrogen isotopic fractionation factors determined in experimental clay-water systems
N79-27740
The digital simulation of areal salt transport to evaluate water management proposals in a coastal aquifer
N79-27803
Dose-effect relationships for ultrasound irradiation of brain tissue
N79-27812
Applications of chlorophyll fluorescence transient measurements to the functional analysis of photosynthetic processes
N79-27813
A new hardware approach to coefficient determination for the linear prediction of speech
N79-27863
The growth of density fluctuations in a finite sized inhomogeneous plasma
N79-27992

Mechanistic studies in the organic solid state
N79-28008
Critical behavior of the n-vector and charged n-vector models from an exact solution to the screening approximation
N79-28016
The scattering of thermal phonons by extended defects in dielectric crystals
N79-28017
A low temperature ultrasonic study of hydrogen in niobium
N79-28019

ILLINOIS UNIV. AT URBANA-CHAMPAIGN, URBANA.
Low temperature, glass-like properties of crystalline beta-alumina
(COO-1198-1233) N79-27294
Analysis of arbitrarily shaped wire antennas radiating over a lossy half-space
(AD-A068548) N79-27365
Transverse momentum distributions in Drell-Yan processes
(ILL-(TH)-79-22) N79-27897
Generalized element method
(COO-2383-0055) N79-27906

ILLINOIS UNIV., URBANA.
Stability of variable-step methods for ordinary differential equations
(COO-2383-0048) N79-27907
The 10 February 1977 lunar occultation of Uranus. Radius, limb darkening, and polar brightening at 6900 A
(NASA-CR-158780) N79-28074
Radio observations of asteroids: Results and prospects
(NASA-CR-158781) N79-28075

ILLINOIS UNIV., URBANA-CHAMPAIGN.
The development of methods for predicting and measuring distribution patterns of aerial sprays
(NASA-CR-158787) N79-27092

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
The basic equations
N79-27277
Reacting and interacting hypersonic boundary layers
N79-27439
Respiration
N79-27845
Mechanics of arterial blood flow
N79-27846
Mechanics of the microcirculation
N79-27847
Mass transport in arteries
N79-27848
Pulmonary circulation and microcirculation
N79-27849
Techniques of measurement
N79-27850

INDIAN SPACE RESEARCH ORGANIZATION, BANGALORE.
Indian national committee for space research report to COSPAR
N79-27194

INSTITUT D'AERONOMIE SPATIALE DE BELGIQUE, BRUSSELS.
Kinetic versus hydrodynamic solar wind models
(AERONOMICA-ACTA-A-196-1978)
N79-28107

INSTITUT FRANCAIS DE PETROLE, GRENOBLE (FRANCE).
Remote sensing of hydrocarbon pollution
N79-27725

INSTITUT FUER ANGEWANDTE FESTKOERPERPHYSIK DER FRAUNHOFER GESELLSCHAFT E.V., FREIBURG IM BREISGAU (WEST GERMANY).
Passivation of high voltage power devices by thermal oxidation
(BMFT-FB-T-78-23) N79-27426

INSTITUT FUER ANGEWANDTE GEODAESIE, FRANKFURT AM MAIN (WEST GERMANY).
Simultaneous determination of the components xi and eta of the deviation from the vertical with an astrolab prism: Part Vb: Observations at 48deg latitude during 1972
(SER-B-199-MITT-143) N79-28079
On the simultaneous determination of the components xi eta of the deviation of the vertical using an astrolab prism
(SER-B-222-MITT-146) N79-28085

INSTITUT FUER DAS BAUEN MIT KUNSTSTOFFEN E.V., DARMSTADT (WEST GERMANY).
Description of the possibilities for energy savings during the design and construction of apertures in buildings [cross-section report]
(BMFT-FB-T-78-15) N79-27345

INSTITUT FUER SYSTEMTECHNIK UND INNOVATIONSFORSCHUNG, KARLSRUHE (WEST GERMANY).
Identification of social and economic difficulties associated with the introduction of solar energy devices
(BMFT-FB-T-78-47) N79-27712

INSTITUT NATIONAL DES SCIENCES APPLIQUEES DE LYON, VILLEURBANNE (FRANCE).
The analysis of engine vibrations
N79-27150

INSTITUUT VOOR CULTURRTECHNIEK EN WATERHUISHOUDING, WAGENINGEN (NETHERLANDS).
The Tergra model: A mathematical model for the simulation of the daily behavior of crop surface temperature and actual evapotranspiration
(REPT-1014) N79-27645

INSTITUTE FOR INDUSTRIAL RESEARCH AND STANDARDS, DUBLIN (IRELAND).
IEA biomass information service. Current awareness bulletin, May - June 1978
(NP-23641) N79-27334

INSTITUTE FOR PERCEPTION RVO-TNO, SOESTERBERG (NETHERLANDS).
Acceptable radiation levels in the ultraviolet visible infrared regions
(IZF-1978-15) N79-27853

INSTITUTE FOR TELECOMMUNICATION SCIENCES, BOULDER, COLO.
Transionospheric radio propagation
N79-27387

INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL.
Study of the behavior of gas distribution equipment in hydrogen service update 1978
(CONF-781142-5) N79-27328
Evaluation of the flash desulfurization process for coal cleaning
(PB-292328/2) N79-27342

INSTITUTE OF GEOLOGICAL SCIENCES, EDINBURGH (SCOTLAND).
Spherical harmonic models of the geomagnetic field
(BULL-8) N79-27761

INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
Electromagnetic waves in free space
(INPR-1475-RPE/026) N79-27353
Remote sensoring of the southeast region of the state of Sao Paulo: A proposition of a methodology for the geological interpretation of SLAR images
(INPE-1461-NTE/148) N79-27356
The nonreciprocal directional filter, a multipurpose ferrite device
(INPE-1448-RPE/013) N79-27402
Comments on the paper entitled the quenching of OH* in the atmosphere by Llewellyn, Long and Solheim
(INPE-1484-RPE/030) N79-27745
Central plane of the ring current responsible for geomagnetic disturbance in the South American region
(INPE-1482-RPE/029) N79-27746
Influence of northern and southern hemisphere sq current systems on the equatorial region
(INPE-1434-RPE/010) N79-27747
Estimation of the geopotential coefficients
(INPE-1427-RPE/006) N79-27749
Diurnal rainfall variability in northeast Brazil
(INPE-1487-RPE/033) N79-27774
Relation of Richardson number to the curvature of the wind profile
(INPR-1486-RPE/032) N79-27775
Effects of the liberation of the latent heat of condensation on the development of disturbances at median latitudes
(INPE-1438-TDL/005) N79-27776
Correcting memory of microcontrol system aided by a computer
(INPE-1489-TDL/009) N79-27874
Transformations of spherical harmonics and applications to geodesy and satellite
(INPE-1453-RPE/018) N79-27895
Induction of decision rules
(INPE-1492-RPE/036) N79-27920
Macroscopic transport equations
(INPE-1471-RPE/022) N79-27997
On the use of the photoacoustic effect for investigating phase-transitions in solids
(INPE-1476-RPE/027) N79-28026
Background radiation in some recent high-resolution measurements in gamma-ray astronomy
(INPE-1474-RPE/025) N79-28076
On the origin of the elements: A brief review
(INPE-1466-RPE/019) N79-28087
Solar and lunar daily variation at low latitudes during quiet and disturbed days
(INPE-1435-RPE/011) N79-28088
Periodicities in the interplanetary magnetic field polarity
(INPE-1425-RPE/005) N79-28089
Relationship between sunspot numbers during years of sunspot maximum and sunspot minimum
(INPR-1485-RPE/031) N79-28108
Codification and decodification of the pulse amplitude originating from space radiation
(INPE-1430-NTE/146) N79-28117

INSTITUTO DE PESQUISAS ESPACIAIS, SAO PAULO (BRAZIL).
The utilization of a national polymer acquired for solid propellants used in space vehicles
(INPE-1473-RPE/024) N79-27325
Determination of homogeneous zones by remote sensors
(INPE-1470-RPE/021) N79-27641
Classification of multispectral images of natural resources using table look-up approach and clustering
(INPE-1439-TDL/006) N79-27642

INSTITUTO TECHNOLOGICO DE AERONAUTICA, SAO PAULO (BRAZIL).
Physical components of tensors
N79-27896

INSTYTUT LOTNICTWA, WARSAW (POLAND).
Improvement of hang glider performance by use of ultralight elastic wing
N79-27082

INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS, LAXENBURG (AUSTRIA).
Supply-demand price coordination in water resources management
(IIASA-RR-78-11) N79-27627
On fossil fuel reserves and resources
(IIASA-RM-78-35) N79-27628
A review of energy models. Part 4: July 1978
(IIASA-RR-78-11-PT-4) N79-27652

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Minimum altitude-loss soaring in a specified vertical wind distribution
N79-27071
X-ray excited optical luminescence of poly-nuclear aromatic hydrocarbons
N79-27266
A systematic determination of extended atomic orbital basic sets and application to molecular SCF and MCSCF calculations
N79-27941
Kinetic models for irreversible processes on a lattice
N79-28011
Hydrogen diffusion and electronic structure parameters in tantalum hydrides determined by pulsed NMR measurements
(IS-M-178) N79-28029
The hadron spectrum at ground level, part 1. The stability of the period of cygnus x-3, part 2
N79-28072

IOWA UNIV., IOWA CITY.
Research in space physics at the University of Iowa
(NASA-CR-158782) N79-28065

ISTITUTO NAZIONALE DI FISICA NUCLEARE, ROME (ITALY).
Determination of NYK coupling constants by the Haber-Schaim method
(REPT-87) N79-27953
High energy behavior of pion-nucleon-scattering partial waves from amplitude analysis
(REPT-78) N79-27969

ISTITUTO SUPERIORE DI SANITA, ROME (ITALY).
ESR studies on different pathological states
(ISS-L-22/9) N79-27854
Problems related to the assessment of safe exposure levels for radio frequency and microwave radiation
(ISS-P-78/7) N79-27855
Research activities of the Radiation Laboratory
(ISS-R-78/6) N79-27954

J

JET PROPULSION LAB., CALIF. INST. OF TECH., PASADENA.
Wind field and trajectory models for tornado-propelled objects
(NASA-CR-158775) N79-27091
Space augmentation of military high-level waste disposal
(NASA-CR-158771) N79-27193
Effects of space environment on composites: An analytical study of critical experimental parameters
(NASA-CR-158767) N79-27244
Compatibility of elastomers in alternate jet fuels
(NASA-CR-158773) N79-27321
Modeling of polymer networks for application to solid propellant formulating
(NASA-CR-158788) N79-27326
Proceedings of the Conference on Coal Use for California
(NASA-CR-158770) N79-27597
Performance prediction evaluation of ceramic materials in point-focusing solar receivers
(NASA-CR-158774) N79-27654
Study of membrane reflector technology
(NASA-CR-158729) N79-27655
Potential for cogeneration of heat and electricity in California industry, phase 2
(NASA-CR-158772) N79-27658
Proceedings of the Distribution Automation and Control Working Group. Volume 2: Proceedings
(NASA-CR-158769) N79-27659
The effects of regional insolation differences upon advanced solar thermal electric power plant performance and energy costs
(NASA-CR-158768) N79-27660

Apparatus and method of inserting a microelectrode in body tissue or the like using vibration means
[NASA-CASE-NPO-13910-1] N79-27836

JOHNS HOPKINS UNIV., BALTIMORE, MD.
Mass spectrometric studies of some ions
N79-27257
Piecewise polynomial configuration interaction natural orbital study of 1s2 helium
N79-27259
A theory for portions of the energy spectrum and for intermittency of fine-scale turbulence
[AD-A068743] N79-27466
A simple method to increase the robustness of t-type interval estimators in some practical situations
N79-27915
Extreme ultraviolet diagnosis of a neutral-beam-heated mirror machine
N79-27994
An EUV study of impurities in the Alcator A tokamak
N79-27996
Depth profiling of the magnetic hyperfine field in ultra-thin films of iron
N79-28020

JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Space biology and aerospace medicine, v. 13, no. 3, 1979
[JPRS-73784] N79-27817
Helium-oxygen mixture and the organism hyperbaric aspect
N79-27818
Simulation of fluid-electrolyte metabolism as a means of preventing orthostatic instability in the crew of the second expedition aboard the Salyut-4 station
N79-27819
Investigation of albumin and globulin composition of blood of the crew of the Salyut-3 orbital station
N79-27820
The combined effect of space flight factors and radiation on rat skeletal muscles
N79-27821
Catecholamines and enzymes of metabolism thereof in the rat hypothalamus after flight aboard Cosmos-782 biosatellite
N79-27822
Tissular metabolism in mixed type fibers of rat skeletal muscles after flight aboard Cosmos-690 biosatellite
N79-27823
Immunological reactivity of rats flown aboard Cosmos-605 and Cosmos-690 biosatellites
N79-27824
Possibilities of preventing adverse reactions in simulating the acute period of adaptation to weightlessness
N79-27825
Probability of caisson disease while wearing a space suit when exiting from a spacecraft with an atmosphere close to that of earth
N79-27826
Pneumotachographic distinctions of external respiration in man in the presence of excess intrapulmonary pressure on ground level and at high altitudes
N79-27827
Effect of acute hypoxia on some parameters of renal excretory function and renal hemodynamics
N79-27828
Toxicity of oxygen mixed with helium
N79-27829
Effect of hyperbaric oxygen on peripheral blood neutrophil metabolism
N79-27830
Effect of brief head-down hypokinesia on pressure in various parts of the healthy man's cardiovascular system
N79-27831
Evaluation of circulatory reactions in the head to antiorthostatic position
N79-27832
Animal endurance to recurrent impact accelerations
N79-27833
Characteristics of proteins of some unicellular organisms as potential components of ecological life support systems
N79-27834
Morphological distinctions of the rat thyroid and parathyroid following long-term space flights
N79-27835
Translations on USSR science and technology: Biomedical and behavioral sciences, no. 81
[JPRS-73729] N79-27860
The systemic principles of building a man-machine control staff
N79-27861
Effects of vibration on the human organism
N79-27862

K

KANSAS STATE UNIV., MANHATTAN.
The synthesis of organic reagents for the trace analysis of air pollutants
N79-27714

KARLSRUHE UNIV. [WEST GERMANY].
Effective difference method for solving non-stationary two dimensional hypersonic flow boundary layer problems under chemical nonequilibrium conditions
[KU-RZ-9/1977] N79-27104
The influence of error introduced by thermal stable thermodynamic and kinetic reaction variables on the solution of equations for two-dimensional laminar hypersonic boundary layers
[KU-RZ-10/1977] N79-27105
Influence of chemical reactions and other parameters on the hypersonic boundary layer in air
[KU-RZ-12/1977] N79-27106

KERNFORSCHUNGSANLAGE, JUELICH [WEST GERMANY].
Potentialities for an improvement of the efficiency of fluorescent mercury lamps
[BMFT-FB-T-78-22] N79-27425
New sets of diffusion parameters resulting from tracer experiments in 50 and 100 metres release height
N79-27564

KEWANEE OIL CO., SHIDLER, OKLA.
North Stanley Polymer Demonstration Project
[BETC/RI-78/19] N79-27313

KIDDE [WALTER] AND CO., INC., BELLEVILLE, N. J.
Grip-connected integrated community energy system. Phase 2: Detailed feasibility and preliminary design, stage 2
[COO-4337-2/2] N79-27701

L

LABORATOIRE CENTRAL DE RECHERCHES THOMSON-CSF, ORSAY [FRANCE].
Ion implantation and its effects on the propagation of elastic surface waves
[LCR-494-305] N79-27368
A central multichannel coupler for connections between fiber optic bundles
[LCR-14077] N79-27369
InP and GaAs surface characterization with variable stoichiometry obtained by molecular spray. Applications to the manufacture of Schottky diodes
[LCR-2270-DK] N79-27414
Magnetic effects in integrated optics
[LCR-494-292] N79-27982
Study of electrical optical materials having increased photosensitivity
[LCR-77-32/R/G.5] N79-27983
The use of molecular sprays in ultrahigh vacuum for GaAs monocrystalline growth applications
[LCR-2251-DK-PT-1] N79-28031
In depth study of the magnetocrystalline anisotropy of polycrystalline ferrimagnetic oxides
[LCR-1437/77] N79-28032

LABORATORIO DE ACUSTICA E SONICA, SAO PAULO [BRAZIL].
Ultrasonic inspection of engine nacelle structure searching for cracks
[REPT-7610.909] N79-27522
Ultrasonic inspection of wing spar attachment joints and lugs in viscount aircraft
[REPT-7610.910] N79-27523

LABORATORIO DI RICERCA E TECHNOLOGIA PER LO STUDIO DEL PLASMA NELLO SPAZIO, FRASCATI [ITALY].
The transfer function and Brownian noise of the gravitational antenna
[LPS-78-1] N79-27380
Optimization of the noise to signal ratio in a single photon counting photomultiplier
[LPS-78-6] N79-27381
Search for gravitational waves
[LPS-78-3] N79-27762
Local instabilities of Alfven waves in high speed streams
[LPS-78-2] N79-28111

LABORATORIO PROVINCIALE IGIENE E PROFILASSI, MILAN [ITALY].
Validation of the SO2 emission inventory for the Milan district area [50 X 60 km]
N79-27595

LABORATORIUM FUER BETRIEBSFESTIGKEIT, DARMSTADT [WEST GERMANY].
Investigation into computing the distribution of fatigue life by Monte-Carlo methods
[LBF-FR-138] N79-27526
Computation of the irregularity factor N sub 0/N sub 1 of a stationary Gaussian process with dual peak power spectral density
[LBF-TB-137] N79-27919

LAKE CHAMPLAIN BASIN STUDY, BURLINGTON, VT.
Energy use and supply in the Lake Champlain Basin
[PB-293437/0] N79-27713

LIEGE UNIV. [BELGIUM].
On global optimal sailplane flight strategy
N79-27073
Stress interpretation in the finite element method
N79-27155
Distortions, rotating stall and mechanical solicitations
N79-27177

LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
Discrete Address Beacon System [DABS] Air Traffic Control Radar Beacon System [ATCRBS] interference analysis
[AD-A068565] N79-27119
The DABS calibration performance monitoring equipment
[AD-A069126] N79-27120
Developing, testing, and operating Lincoln experimental Satellites 8 and 9 [LES-8/9]
[AD-A069095] N79-27218
Endurance and soil accumulation testing of photovoltaic modules at various MIT/LL test sites
[COO-4094-23] N79-27671
Design development and implementation of data acquisition systems for photovoltaic tests and applications project
[COO-4094-24] N79-27672
Photovoltaic-powered irrigation experiments in the United States
[COO-4094-28] N79-27673
Mead 25 kilowatt photovoltaic system
[COO-4094-19] N79-27677
On optimal discriminants between two classes of random variables in terms of the moments of their distributions
[AD-A068551] N79-27904

LOCKHEED-CALIFORNIA CO., BURBANK.
Summary of results for a twin-engine, low-wing airplane substructure crash impact condition analyzed with program KRASH
[AD-A069171] N79-27116
Flight service evaluation of Kevlar-49 epoxy composite panels in wide-bodied commercial transport aircraft
[NASA-CR-159071] N79-27246

LOCKHEED ELECTRONICS CO., HOUSTON, TEX.
Multiple band circularly polarized antenna
[NASA-CASE-MSC-18334-1] N79-27348
Software requirements for the study of contextual classifiers and label imperfections
[NASA-CR-160239] N79-27875
Local neighborhood transition probability estimation and its use in contextual classification
[NASA-CR-160261] N79-27916
Efficient feature subset selection with probabilistic distance criteria
[NASA-CR-160263] N79-27917

LOCKHEED-GEORGIA CO., MARIETTA.
Studies of the acoustic transmission characteristics of coaxial nozzles with inverted velocity profiles: Comprehensive data report
[NASA-CR-159628] N79-27933

LOS ALAMOS SCIENTIFIC LAB., N. MEX.
The marker-and-cell method
N79-27451
The particle in-cell method
N79-27452
A Lagrangian method for calculating the dynamics of an incompressible fluid with free surface
N79-27453
A numerical fluid dynamics calculation method for all flow speeds
N79-27454
Fermion Hamiltonians with monopole and quadrupole pairing
[LA-UR-79-241] N79-27947
Cryogenic laser fusion target materials
[LA-UR-79-101] N79-28002

LOWELL UNIV. RESEARCH FOUNDATION, MASS.
Computation of H2O quadrupole moment matrix elements for pressure broadening calculations
[AD-A068569] N79-27945

LUDWIG-MAXIMILIANS-UNIVERSITAET, MUNICH [WEST GERMANY].
Geodetic applications of inertial navigational systems
[AD-A067179] N79-27121

M

MAGNAVOX GOVERNMENT AND INDUSTRIAL ELECTRONICS CO., FORT WAYNE, IND.
Magnetic particles display matrix-address demonstrator
[AD-A067642] N79-27481

MARKET FACTS, INC., WASHINGTON, D. C.
Shale oil: Focus group results
[DOE/TIC-10019] N79-27644

MARTIN MARIETTA AEROSPACE, DENVER, COLO.
Handbook on astronaut crew motion disturbances for control system design
[NASA-RP-1025] N79-27237
A 10-kilowatt photovoltaic concentrator array
[SAND-78-7024] N79-27699
MARTIN MARIETTA CORP., BALTIMORE, MD.
Stack plume characterization and model assessment with lidar data
N79-27562
MARTIN MARIETTA CORP., ORLANDO, FLA.
Guidance Simulation Techniques
N79-27229
Testing of missile guidance and control systems
N79-27231
MARYLAND UNIV., COLLEGE PARK.
Gas dynamic lasers: Theory, experiment and the state-of-the-art
N79-27489
Investigating software development approaches
[AD-A068742] N79-27880
An investigation of K-folo complex cobordism
N79-27888
Topics in astrophysical X-ray and gamma ray spectroscopy
N79-28067
MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Engine rotor burst containment/control studies
N79-27162
Optical communication and detection through optical scattering channels
N79-27390
Response of structures to dynamic loading
[AD-A068567] N79-27534
MATHEMATICA, INC., PRINCETON, N. J.
Coal liquefaction: Report on a focus group discussion
[DOE/TIC-10039] N79-27339
MAX-PLANCK-INSTITUT FUER PHYSIK UND ASTROPHYSIK, GARCHING [WEST GERMANY].
A bolometer for 0.3 Kelvin
[MPI-PAE/EXTRATERR-143] N79-27486
Construction and setting up of a lamellar grating with a very wide spectral range and its use as a Fourier spectrometer for astrophysical measurements on large molecules
[MPI-PAE/EXTRATERR-144] N79-27949
Measurement of the spectral sensitivity of radiation detectors and detector systems in the vacuumultraviolet spectral range by using a wall stabilized Ar cascade arc according to Boldt as a standard radiator
[MPI-PAE/EXTRATERR-142] N79-27968
Image quality of a Wolter-1 type X-ray telescope under particular contrast reduction conditions due to diffuse reflection
[MPI-PAE/EXTRATERR-145] N79-27984
MAX-PLANCK-INSTITUT FUER STROEMUNGSFORSCHUNG, GOETTINGEN [WEST GERMANY].
Investigation of wall pressure fields beneath turbulent boundary layers
[MPIS-11/1978] N79-27108
Measurement of the rate constant for the NO+HO2 yields OH+NO2 reaction using laser magnetic resonance
[MPIS-8/1978] N79-27285
Research on elementary HO2 and OH radical reactions in the gas phase using laser magnetic resonance
[MPIS-10/1978] N79-27286
IR laser induced dissociation of N2F4 and isomerization of CH3NC
[MPIS-12/1978] N79-27287
Soot formation in combustion
[MPIS-22/1978] N79-27288
Formation of dimers in rare gas beams from nozzles
[MPIS-5/1978] N79-27950
Total scattering cross sections for He[2(1)S, 2(3)S] on He, Ne, Ar, Kr in the thermal energy region
[MPIS-7/1978] N79-27951
Measurements of differential cross sections for electronic excitations on Na-Hg K-Hg, and Cs-Hg systems
[MPIS-13/1978] N79-27952
Experimental and theoretical studies of integral excitation cross sections associated with alkali-rare gas collisions
[MPIS-3/1978] N79-28005
A table of miscellaneous thermodynamic properties for various substances with emphasis on the critical properties
[MPIS-6/1978] N79-28040
MCDONNELL AIRCRAFT CO., ST. LOUIS, MO.
Aircraft hydraulic systems dynamic analysis
[AD-A067549] N79-27129
Effect of variances and manufacturing tolerances on the design strength and life of mechanically fastened composite joints
[AD-A069170] N79-27518
MCDONNELL-DOUGLAS ASTRONAUTICS CO., HUNTINGTON BEACH, CALIF.
Meta assembler enhancements and generalized linkage editor
[NASA-CR-161255] N79-27872
MCDONNELL-DOUGLAS ASTRONAUTICS CO., ST. LOUIS, MO.
Exploratory development of resonant metal radomes
[AD-A067547] N79-27357
Microbial load monitor
[NASA-CR-160274] N79-27815
MEDICAL BIOLOGICAL LAB. RVO-TNO, RIJSWIJK [NETHERLANDS].
Advice on the setting up of a workshop for treating tritium gas light sources at 527 ECW at Dongen
N79-27344
MEDIZINISCHE HOCHSCHULE HANNOVER [WEST GERMANY].
Balance training of the equilibrium organ and its effect on flight strategy
N79-27074
MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., MUNICH [WEST GERMANY].
Dynamic pressure loads in the air induction system of the tornado fighter aircraft
N79-27168
MESSERSCHMIDT-BOELKOW G.M.B.H., OTTOBRUNN [WEST GERMANY].
Dynamics of the boost phase
N79-27212
The consideration of wing-body and wing-tail interference in missile-design
N79-27213
Planning, execution and statistical evaluation of hit simulations
N79-27214
The application of ram-type engines to long-range supersonic missiles
N79-27215
Noise adaptive filter
N79-27216
MIAMI UNIV., CORAL GABLES, FLA.
A numerical model of acoustic fluctuations for single- and paired-path transmissions in real and canonical oceans
N79-27801
MILCO INTERNATIONAL, INC., HUNTINGTON BEACH, CALIF.
State of the art survey of technologies applicable to NASA's aeronautics, avionics and controls program
[NASA-CR-159050] N79-27087
MINNESOTA UNIV., MINNEAPOLIS.
Computer programs for scoring test data with item characteristic curve models
[AD-A067752] N79-27878
MISSOURI UNIV. - COLUMBIA.
Effect of phosphorus supply on algal biomass in a turbid Missouri Reservoir
[PB-293183/0] N79-27816
MISSOURI UNIV. -ROLLA.
Transport properties in the atmosphere of Jupiter
[NASA-CR-158783] N79-28100
MITRE CORP., MCLEAN, VA.
Definition, description, and interfaces of the FAA's developmental programs. Volume 1: Overview
[AD-A068226] N79-27117
Definition, description, and interfaces of the FAA's developmental programs. Volume 2: ATC facilities and interfaces
[AD-A068401] N79-27118
Comparative economic assessment of ethanol from biomass
[HCP/ET-2854] N79-27335
MOTOREN- UND TURBINEN-UNION MUENCHEN G.M.B.H. [WEST GERMANY].
A contribution on thermal fatigue in cooled turbine blading
N79-27153

N

NAPLES UNIV. [ITALY].
Derivation of the basic equations for non-equilibrium boundary layers
N79-27438
NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
Massively parallel processor computer
[NASA-CASE-GSC-12223-1] N79-27864
Radioactive wastes at the Hanford Reservation: A technical review
[COO-2708T004-1] N79-27963
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C.
Aeronautical Engineering: A continuing bibliography with indexes, supplement 110
[NASA-SP-7037[110]] N79-27068
Sixty years of aeronautical research, 1917-1977
[NASA-EP-145] N79-27089
Description of the TC 125 aboard the Mercury simulator
[NASA-TM-75479] N79-27198
Vibration of bearings
[NASA-TT-F-679] N79-27501
The NASTRAN theoretical manual [level 16.0]
[NASA-SP-221[03]] N79-27531
Energy: A continuing bibliography with indexes, issue 21
[NASA-SP-7043[21]] N79-27647
Reports of planetary geology program, 1978 - 1979
[NASA-TM-80339] N79-28066
Tropospheric limitations on the accuracy of phase measurement of coordinates in astronomy
[NASA-TM-75480] N79-28073
Voyager 2 Jupiter encounter
[NASA-NEWS-RELEASE-79-86] N79-28094
What's new on the moon?
[NASA-EP-131] N79-28096
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Leading-edge slat optimization for maximum airfoil lift
[NASA-TM-78566] N79-27100
An advanced cockpit instrumentation system: The coordinated cockpit display
[NASA-TM-78559] N79-27136
Aerodynamics of a tilt-nacelle V/STOL propulsion system
[NASA-TM-78606] N79-27138
A comparison of the V/STOL handling qualities of the VAK-191B with the requirements of AGARD report 577 and MIL-F-83300
[NASA-TP-1494] N79-27182
Earth winds, flow quality, and the minimum-protection inlet treatment for the NASA Ames 80- by 120-foot wind tunnel nonreturn circuit
[NASA-TM-78600] N79-27186
Photosensitized oxidation of unsaturated polymers
[NASA-TM-78604] N79-27241
Effects of moisture on torsion and flexure properties of graphite-epoxy composites
[NASA-TM-78597] N79-27243
An examination of a group-velocity criterion for the breakdown of an idealized vortex flow
[NASA-TM-78541] N79-27436
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. HUGH L. DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIF.
Correlation of predicted and measured thermal stresses on an advanced aircraft structure with dissimilar materials
[NASA-TM-72865] N79-27088
Power converter
[NASA-CASE-FRC-11014-1] N79-27395
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Buck/boost regulator
[NASA-CASE-GSC-12360-1] N79-27394
An algorithm for retrieval of ocean surface and atmospheric parameters from the observations of the scanning multichannel microwave radiometer (SMMR)
[NASA-TM-80277] N79-27635
Directional spectra of ocean waves from microwave backscatter: A physical optics solution with application to the short-pulse and two-frequency measurement techniques
[NASA-TM-80295] N79-27636
Radiometric resolution for monitoring vegetation: How many bits are needed?
[NASA-TM-80293] N79-27637
Relationship of red and photographic infrared spectral radiances to alfalfa biomass, forage water content, percentage canopy cover, and severity of drought stress
[NASA-TM-80272] N79-27638
Remote sensing of leaf water content in the near infrared
[NASA-TM-80291] N79-27639
A model for the microwave emissivity of the ocean's surface as a function of wind speed
[NASA-TM-80278] N79-27640
Tectonic motion site survey of the National Radio Astronomy Observatory, Green Bank, West Virginia
[NASA-TM-79691] N79-27748
Massively parallel processor computer
[NASA-CASE-GSC-12223-1] N79-27864
High energy X-ray and radio studies of Scorpius X-1
[NASA-TM-80298] N79-28077
Pulse phase spectroscopy of Hercules X-1
[NASA-TM-80299] N79-28078
Globally baryon symmetric cosmology, GUT spontaneous symmetry breaking, and the structure of the universe
[NASA-TM-80306] N79-28090
Cosmological baryon number domain structure from symmetry-breaking in grand unified field theories
[NASA-TM-80281] N79-28091
A search for X-ray emission from rich clusters, extended halos around clusters, and superclusters
[NASA-TM-80294] N79-28092
Voyager 1 planetary radio astronomy observations near Jupiter
[NASA-TM-80287] N79-28103
Magnetic field studies at Jupiter by Voyager 1: Preliminary results
[NASA-TM-80288] N79-28104

A theory of local and global processes which affect solar wind electrons. 2: Experimental support [NASA-TM-79628] N79-28109
A three-dimensional model of co-rotating streams in the solar wind. 2: Hydrodynamic streams [NASA-TM-80276] N79-28110
The mean free path of low rigidity cosmic rays [NASA-TM-80290] N79-28114
Gamma-ray burst observations from Helios-2 [NASA-TM-80284] N79-28115
Extraterrestrial high energy neutrino fluxes [NASA-TM-80304] N79-28116

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Large Area Crop Inventory Experiment [LACIE]. An early estimate of small grains acreage [E79-10212] N79-27629
ORRC/SAIL interface control document for SAIL OFT data tapes, revision A [NASA-TM-80479] N79-27873
The effects of context on multidimensional spatial cognitive models [NASA-TM-58219] N79-28045
NASA JSC water monitor system: City of Houston field demonstration [NASA-RP-1041] N79-28062
Consideration of sample return and the exploration strategy for Mars [NASA-TM-58213] N79-28102

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Automatic flowmeter calibration system [NASA-CASE-KSC-11076-1] N79-27479
Decommutator patchboard verifier [NASA-CASE-KSC-11065-1] N79-27865

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
Science and Technology of Low Speed and Motorless Flight. Third International Symposium [NASA-CR-2085] N79-27070
A study of course deviations during cross-country soaring N79-27072
Treatment of the control mechanisms of light airplanes in the flutter clearance process N79-27078
Technology requirements and readiness for very large vehicles [NASA-TM-80127] N79-27086
Onset of condensation effects as detected by total pressure probes in the Langley 0.3-meter transonic cryogenic tunnel [NASA-TM-80072] N79-27094
Influence of optimized leading-edge deflection and geometric anhedral on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration [NASA-TM-80083] N79-27095
An exploratory study of a finite difference method for calculating unsteady transonic potential flow [NASA-TM-80105] N79-27096
A flight investigation of basic performance characteristics of a teetering-rotor attack helicopter [NASA-TM-80112] N79-27097
An exploratory investigation of the effect of a plastic coating on the profile drag of a practical-metal-construction sailplane airfoil [NASA-TM-80092] N79-27098
Pressure distributions on three different cruciform aft-tail control surfaces of a wingless missile at mach 1.60, 2.36, and 3.70 Volume 1: Trapezoidal tail [NASA-TM-80097] N79-27099
Experimental and analytical study of fatigue damage in notched graphite/epoxy laminates [NASA-TM-80121] N79-27245
A study of response time of pitot pressure probes designed for rapid response and protection of transducer [NASA-TM-80091] N79-27462
Stress-intensity factors for internal surface cracks in cylindrical pressure vessels [NASA-TM-80073] N79-27532
Computer predictions of photochemical oxidant levels for initial precursor concentrations characteristic of southeastern Virginia [NASA-TM-80111] N79-27717
Meteorological and operational aspects of 46 clear air turbulent sampling missions with an instrumented B-57B aircraft. Volume 2, appendix C: Turbulence missions [NASA-TM-80045] N79-27772
A comparison of simulated and experimental wave spectra in the nearshore region [NASA-TM-80478] N79-27806
An experimental study of sound radiation from hyperboloidal inlet ducts [NASA-TM-80109] N79-27931
On the attenuation of sound by three-dimensionally segmented acoustic liners in a rectangular duct [NASA-TM-80118] N79-27932

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
Performance of a V/STOL tilt nacelle inlet with blowing boundary layer control [NASA-TM-79176] N79-27093
Turbine engine altitude chamber and flight testing with liquid hydrogen [NASA-TM-79196] N79-27140
Energy efficient aircraft engines [NASA-TM-79204] N79-27141
Flow visualization of discrete-hole film cooling with spanwise injection over a cylinder [NASA-TP-1491] N79-27142
Performance of two-stage fan having low-aspect-ratio first-stage rotor blading [NASA-TP-1493] N79-27143
Review of the AGARD S and M panel evaluation program of the NASA-Lewis SRP approach to high-temperature LCF life prediction N79-27179
Supersonic unstalled flutter N79-27181
High voltage surface-charged environment test results from space flight and ground simulation experiments [NASA-TM-79184] N79-27235
A thermal control approach for a solar electric propulsion thrust subsystem [NASA-TM-79175] N79-27236
Electrochemical fluorination of trichloroethylene and N, N-dimethyltrifluoroacetamide [NASA-TM-79188] N79-27242
Mass spectrometric investigation of the vaporization of sodium and potassium chromates: Preliminary results [NASA-TM-79210] N79-27279
Adhesive material transfer in the erosion of an aluminum alloy [NASA-TM-79165] N79-27306
Auger spectroscopy analysis of lubrication with zinc dialkyldithiophosphate of several metal combinations in sliding contact [NASA-TP-1489] N79-27308
Modules of rupture and oxidation resistance of S12.55Al0.6O0.72N3.52 sialon [NASA-TP-1490] N79-27309
Satellite communications for disaster relief operations [NASA-TM-79198] N79-27351
Design of high-perveance confined-flow guns for periodic-permanent-magnet-focused tubes [NASA-TP-1485] N79-27400
Some flow characteristics of conventional and tapered high pressure drop simulated seals [NASA-TM-79192] N79-27460
Condensation on a noncollapsing vapor bubble in a subcooled liquid [NASA-TM-79212] N79-27461
Evaluation of miniature single-wire sheathed thermocouples for turbine blade temperature measurement [NASA-TM-79173] N79-27480
Energy-state formulation of lumped volume dynamic equations with application to a simplified free piston Stirling engine [NASA-TM-79197] N79-27663
Reduction of particulate carryover from a pressurized fluidized bed [NASA-TM-79216] N79-27664
Energy and cost saving results for advanced technology systems from the Cogeneration Technology Alternatives Study [CTAS] [NASA-TM-79213] N79-27665
Trailing edge noise data with comparison to theory [NASA-TM-79208] N79-27930

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
Multiple band circularly polarized antenna [NASA-CASE-MSC-18334-1] N79-27348
Apollo telescope mount: A partial listing of scientific publications and presentations, supplement 3 [NASA-TM-78303] N79-27500
An evaluation of grease type ball bearing lubricants operating in various environments [NASA-TM-78232] N79-27515
Evaluation of registration, compression and classification algorithms. Volume 1: Results [NASA-TM-78227-VOL-1] N79-27630
Evaluation of registration, compression and classification algorithms. Volume 2: Documentation [NASA-TM-78227-VOL-2] N79-27631
Test of concentrator solar array model for SEPS [NASA-TM-78230] N79-27662

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
Apparatus and method of inserting a microelectrode in body tissue or the like using vibration means [NASA-CASE-NPO-13910-1] N79-27836

NATIONAL AEROSPACE LAB., AMSTERDAM [NETHERLANDS].
The requirement of damage tolerance. An analysis of damage tolerance requirements with specific reference to MIL-A-83444 [NLR-TR-77005-U] N79-27135
Handling problems through compressor deterioration N79-27169
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 1: Numerical aspects N79-27458
A survey of current collocation methods in inviscid subsonic lifting surface theory. Part 2: Calculational aspects of solving the large systems of linear algebraic equations on a digital computer N79-27459

NATIONAL BOARD FOR SCIENCE AND TECHNOLOGY, DUBLIN [IRELAND].
IEA biomass information service. Current awareness bulletin, May - June 1978 [NP-23641] N79-27334

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D. C.
Optical materials characterization [PB-292245/8] N79-27990
Development of hydrogen and hydroxyl contamination in thin silicon dioxide thermal films [AD-A067963] N79-28027

NATIONAL ENGINEERING LAB., EAST KILBRIDE [SCOTLAND].
Heat pipes with headers and single and two phase artery systems [NEL-656] N79-27473
Thermodynamic methods for determining losses in hydraulic components: A survey [NEL-657] N79-28042
Relationship of PVT conditions and specific heat capacity of oils for thermodynamic measurements [NEL-658] N79-28043

NATIONAL GAS TURBINE ESTABLISHMENT, PYESTOCK [ENGLAND].
Application of engine usage analysis to component life utilization N79-27160

NATIONAL GEOPHYSICAL AND SOLAR-TERRESTRIAL DATA CENTER, BOULDER, COLO.
Reevaluation of modified Mercalli intensity scale for earthquakes using distance as determinant [PB-294439/5] N79-27767

NATIONAL MARINE FISHERIES SERVICE, SEATTLE, WASH.
Expendable bathythermograph observations from NMFS/MARAD Ship of Opportunity program for 1975 [PB-294215/9] N79-27811

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NORMAN, OKLA.
Thunderstorm gust fronts: Observations and modeling [AD-A068425] N79-27773

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, OAK RIDGE, TENN.
Parameterizing atmospheric diffusion N79-27553
Prairie grass revisited: Optimum indicators of vertical spread N79-27563

NATIONAL PHYSICAL LAB., TEDDINGTON [ENGLAND].
Diphenyl ether triple point cells [NPL-CHEM-86] N79-27289
Vapor liquid equilibria for the systems water-methanol, waterethanol, methanol-ethanol, and water-methanol-ethanol at 298.15 K determined by a rapid transpiration method [NPL-CHEM-95] N79-27290
SFS: A file system supporting Pascal files. Design and specification [NPL-DNACS-88] N79-28053

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA [ONTARIO].
Canada report to COSPAR N79-27195

NATO COMMITTEE ON THE CHALLENGES OF MODERN SOCIETY, BRUSSELS [BELGIUM].
Proceedings of the Ninth International Technical Meeting on Air Pollution Modeling and its Application [REPT-103] N79-27543

NATURHISTORISCHES MUSEUM, VIENNA [AUSTRIA].
Cape York: The extraordinary mineralogy of an ordinary iron meteorite and its implication for the genesis of III AB irons N79-28099

NAVAL AIR PROPULSION TEST CENTER, TRENTON, N.J.
Rotor bust protection: Design guidelines for containment N79-27166

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
NOSC Metrology Laboratory: Capabilities summary
[AD-A068564] N79-27343
Aircraft fiber-optic interconnect systems project
[AD-A068366] N79-27978
NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
MK 82 bomb ejection sensitivity test report
[AD-A068583] N79-27132
Application of color-coding in airborne tactical displays
[AD-A067558] N79-27137
Design of shock-free transonic flow in turbomachinery
[AD-A067703] N79-27144
Computer modeling of voice signals with adjustable pitch and formant frequencies
[AD-A067556] N79-27360
Pressure on the interface between a converging fluid wedge and a fast fluid bottom
[AD-A067561] N79-27465
Reliability control model for stored items requiring rework
[AD-A067560] N79-27524
An experimental system to measure atmospheric extinction of visible, near and far infrared radiation in the marine boundary layer
[AD-A067557] N79-27751
Arithmetic codes
[AD-A067579] N79-27899
Feasibility study of a computerized management information system for the NOAA Corps personnel system
[AD-A068578] N79-28047
NAVAL RESEARCH LAB., WASHINGTON, D. C.
Optimum launch vehicle sizing
[AD-A068575] N79-27220
Studies of the Navy-ARPA Chemical Laser [NACL] exhaust
[AD-A068079] N79-27496
On the generation of 3 meter irregularities during equatorial spread F by low frequency drift waves
[AD-A068580] N79-27754
X-ray emission from CH2 laser-produced plasmas at 10 to the 16th power w/cm-2
[AD-A067517] N79-27998
NAVAL SURFACE WEAPONS CENTER, DAHLGREN, VA.
Analytical study on the ideal response of normal-mode shock-depoled PZT ferroelectric ceramics with resistive, capacities, and inductive loads
[AD-A068552] N79-27312
NAVAL SURFACE WEAPONS CENTER, WHITE OAK, MD.
Photo-electro-optical reproduction technology survey
[AD-A067534] N79-27977
NAVAL WEATHER SERVICE DETACHMENT, ASHEVILLE, N. C.
Summary of Meteorological Observations, Surface [SMOS] Corpus Christi, Texas
[AD-A067679] N79-27781
Summary of Meteorological Observations, Surface [SMOS]. Lakehurst, New Jersey
[AD-A067683] N79-27782
Summary of Meteorological Observations, Surface [SMOS]. Imperial Beach, California
[AD-A067680] N79-27783
NEW ORLEANS PUBLIC SERVICE, INC., LA.
Grip-connected integrated community energy system. Phase 2: Detailed feasibility and preliminary design, stage 2
[COO-4337-2/2] N79-27701
NEW YORK UNIV., N. Y.
Automatic discovery of heuristics for non-deterministic programs
[AD-A067546] N79-27876
NORTH AMERICAN WEATHER CONSULTANTS, GOLETA, CALIF.
Valley circulation influence on tall stack dispersion from a ridge location
N79-27545
A method of computing maximum ground-level concentrations of SO2 under prolonged stagnation conditions
N79-27546
NORTH CAROLINA STATE UNIV. AT RALEIGH.
An evaluation of the reaction of cellulose with anhydrides/ammonia for the production of flame resistant cellulose derivatives
N79-27305
Analysis of direct nuclear pumped noble gas lasers
N79-27487
Continental margin atmospheric climatology and sea level 1974-1975
[PB-293734/0] N79-27799
The effect of an arbitrary topography on compressible, stably stratified, vertically sheared flow on the Beta plane
N79-27802
Vincent's theorem in algebraic manipulation
N79-27890
Some theorems and counterexamples in monotone approximation
N79-27893
Surface flashover characteristics of alumina dielectric guide cathodes in an intense relativistic electron beam accelerator
N79-27955
NORTH CAROLINA UNIV. AT CHAPEL HILL.
Application of curve-fitting to X-ray photoelectron spectroscopy and cyclic voltammetry
N79-27265
Transport studies of ion exchange membranes
N79-27268
Field effect ion selectivity, part 1. Electrochemical noise, part 2
N79-27270
Theory of interfacial and charge transport phenomena in membrane electrochemistry
N79-27272
The application of ion convection to the development of an electronic spirometer
N79-27477
Acoustical particle sizing device
N79-27715
The Saltville thrust decollement: Deformation of Maccrady formation evaporites
N79-27738
Characterizations of the exponential distributions by relevation type equations
[AD-A067542] N79-27898
A microscopic, submicroscopic, and microseismic analysis of stable crack propagation and the effect of chemical environment on stable crack propagation in synthetic quartz
N79-28009
A study of impurity and radiation induced point defects in MgAl2O4 [spinel]
N79-28015
NORTH DAKOTA STATE UNIV., FARGO.
Photosensitized cationic polymerization
N79-27302
Dilute solution viscosity of water reducible acrylic resins
N79-27303
NORTH DAKOTA UNIV., GRAND FORKS.
Heat flow and heat production studies in North Dakota
N79-27649
NORTHROP CORP., HAWTHORNE, CALIF.
YF-17/ADEN system study
[NASA-CR-144882] N79-27126
NORTHROP SERVICES, INC., HOUSTON, TEX.
Standard operating procedures, water immersion facility, revision B
[NASA-CR-160257] N79-27199
NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT, KJELLER.
Geophysical disturbance effects on the state of the propagation medium and their predictability
N79-27391
Propagation of long radio waves in the earth's environment
N79-27393
NORWEGIAN INST. FOR AIR RESEARCH, LILLESTROM.
Dispersion parameters determined from measurements of wind fluctuations [sigma sub theta], temperature and wind profiles
N79-27566

O

OAK RIDGE ASSOCIATED UNIVERSITIES, TENN.
Electric utilities and solar energy: The service contract in a new social context
[ORAU/IEA[O]-79-3] N79-27685
OAK RIDGE NATIONAL LAB., TENN.
Effect of thermal annealing in boron implanted, laser annealed silicon
[CONF-781167-5] N79-27250
Fracture toughness of fabrication welds investigated by metallographic methods
[CONF-780732-5] N79-27295
Analytical representation of mechanical properties data for 2 1/4 Cr-1 Mo steel
[CONF-781219-6] N79-27296
Elevated temperature ductility of types 304 and 316 stainless steel
[CONF-781202-38] N79-27298
Assessment of load management on the electric power system
[CONF-781182-3] N79-27412
Cyclic stress-strain behavior of ERNiCr-3 weld filler metal
[CONF-781202-31] N79-27535
Assessment of materials for use in a solar ceramic receiver for chemical process heat
[ORNL/TM-6715] N79-27681
Kinetics of silica deposition from simulated geothermal brines
[CONF-790108-1] N79-27691
Market assessment of fuel cell total energy systems
[ORNL/CON-36] N79-27704
ELMO Bumpy Torus. Alternate concepts development program
[CONF-7810127-1] N79-27999
Bending free toroidal shells for tokamak fusion reactors with nonideal magnetic field distributions
[CONF-781202-36] N79-28001
OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN, VIENNA.
Space activity in Austria, 1976/77
N79-28060
OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AERONAUTIQUES, PARIS [FRANCE].
Study in a straight cascade wind tunnel of aeroelastic instabilities in compressors
N79-27178
OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS [FRANCE].
Experimental study of the flight envelope and research of safety requirements for hang-gliders
N79-27083
Calculation of stress concentrations in disc alveoles
N79-27157
Rotating stall in axial flow compressors
N79-27430
Experimental techniques for analyzing unsteady flow in revolving machinery
N79-27433
The functioning of axial compressors without adaptation. The uncoupling boundary and revolving separation
N79-27434
OFFICE OF NAVAL RESEARCH, LONDON [ENGLAND].
Fifth European Specialist Workshop on Microwave Active Semiconductor Devices
[AD-A067492] N79-27405
OHIO STATE UNIV., COLUMBUS.
An ultracentrifugal analysis of polymer size and heat stability of carrageenan
N79-27304
The 911 years of microparticle deposition at the South Pole: A climatic interpretation
N79-27732
Gauge field theories. Part 3: Renormalization
[COO-1545-245-PT-3] N79-27905
OHIO STATE UNIV. RESEARCH FOUNDATION, COLUMBUS.
High energy physics studies. Part 1: Experimental program. Part 2: Theoretical program
[COO-1545-243] N79-27960
ONTARIO MINISTRY OF THE ENVIRONMENT, TORONTO.
Short-term dispersion from tall stacks
N79-27567
OPTIMAL ANALYSIS CO., JERSEY CITY, N. J.
Time dependent methods for multi-dimensional compressible flow problems
N79-27450
OREGON STATE UNIV., CORVALLIS.
Exploration of volcanic geothermal energy resources based on rheological techniques
[DOE/ET/28453-3] N79-27676
A biogeochemical study of manganese in the estuarine zone
N79-27805
OREGON UNIV., EUGENE.
Some observable properties of crystalline electrons in magnetic fields: Exact results in model crystals
N79-28018
ORI, INC., SILVER SPRING, MD.
State of the art survey of technologies applicable to NASA's aeronautics, avionics and controls program
[NASA-CR-159050] N79-27087
ORR-SCHELEN-MAYERON AND ASSOCIATES, INC., MINNEAPOLIS, MINN.
Grip-connected integrated community energy system. Phase 2: Detailed feasibility and preliminary design, stage 2
[COO-4337-2/2] N79-27701
OXFORD UNIV. [ENGLAND].
Extension of running time in the RAE hypersonic shock tunnel
[OUEL-1260/78] N79-27191
Software coding for reliable data communication in a reactor safety system
[OUEL-1264/78] N79-27379
Flow through a furrowed channel. Part 1: Calculated flow patterns
[OUEL-1273/78] N79-27472
The buckling of short tubes under external pressure
[OUEL-1258/78] N79-27542

P

PACER SYSTEMS, INC., ARLINGTON, VA.
Review of airworthiness standards for certification of helicopters for Instrument Flight Rules [IFR] operation
[AD-A068397] N79-27127
PACIFIC GAS AND ELECTRIC CO., SAN FRANCISCO, CALIF.
Coal's role in California's energy needs
N79-27602

PACIFIC MISSILE TEST CENTER, POINT MUGU, CALIF.
Preliminary assessment of temperature induced radiosonde humidity errors and effects on apparent low-level refractive structures, block program WF 52-55-091
[AD-A068670] N79-27784

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Nuclear powered satellite studies
[COO-4045-3] N79-27221
Theoretical background for the choice of stability parameters
N79-27554
Numerical simulations of coastal-zone boundary layer ventilation and pollution transport
N79-27591
Application of the unit regional value concept to a study of the mineral resources of Australia
N79-27624
Ionospheric research
[NASA-CR-158762] N79-27744

PENNSYLVANIA UNIV., PHILADELPHIA.
Theoretical aspects of the resonant scattering of light by molecules
N79-27943

PISA UNIV. (ITALY).
Prediction of aeroelastic instabilities in rotorcraft
N79-27159

PITTSBURGH AND MIDWAY COAL MINING CO., SHAWNEE MISSION, KANS.
Solvent Refined Coal (SRC) process: Environmental program. Volume 3: Pilot plant development work, part 5
[FE-0496-T8] N79-27329

PITTSBURGH UNIV., PA.
Planning nets: A representation for formalizing analogies and semantic models of procedural skills
[AD-A067907] N79-28050

PLESSEY CO. LTD., ROMSEY (ENGLAND).
Component modelling of microwave transistors
[REPT-72/78/91-ISSUE-2] N79-27415

PODLASECK (STANLEY E.), LITTLETON, COLO.
Nonmetallic materials handbook. Volume 1: Epoxy materials
[NASA-CR-3133] N79-27307

POLITECNICO DI TORINO (ITALY).
Experimental investigation into the feasibility of an extruded wing
N79-27077

POPE, EVANS, AND ROBBINS, INC., NEW YORK.
Fluidized combustion of coal
N79-27613

PRATT AND WHITNEY AIRCRAFT GROUP, EAST HARTFORD, CONN.
Boundary-integral equation analysis of an advanced turbine disk rim slot
N79-27161

PRATT AND WHITNEY AIRCRAFT OF CANADA LTD., LONGUEUIL (QUEBEC).
Small turbine engine integration in aircraft installations
N79-27170

PRINCETON UNIV., N. J.
The influence of feedback on the aeroelastic behavior of tilt proprotor aircraft including the effects of fuselage motion
[NASA-CR-158778] N79-27125
Transitions above the glass transition temperature in amorphous polymers
N79-27299

PROPELLANTS, EXPLOSIVES AND ROCKET MOTOR ESTABLISHMENT, WESTCOTT (ENGLAND).
An experimental study of the sensitiveness of unconfined hydrocarbon-air mixtures to direct detonative initiation
[PERME-TR-44] N79-27340

PUBLIC TECHNOLOGY, INC., WASHINGTON, D. C.
Lightning protection for traffic control systems
[NASA-CR-158779] N79-27401

PURDUE UNIV., LAFAYETTE, IND.
New instrumental, mathematical, and chemical developments for kinetic methods of analysis
N79-27267
Investigation on the effect the strain ratio has on sheet metal formability
N79-27291
CARS investigations in sooting and turbulent flames
[AD-A069169] N79-27468
New developments for vidicon-based uv-visible spectrometers
N79-27476
Magnitude estimation as a hearing aid selection procedure
N79-27838
On the least favorable configurations in certain two-stage selection procedures
[AD-A068671] N79-27918

R

RAYTHEON CO., SUDBURY, MASS.
Fault tolerant spaceborne computer study. Preprocessor design
[AD-A067693] N79-27866
Brassboard Fault Tolerant Spaceborne Computer (BFTSC), volume I
[AD-A068553] N79-27869

RCA SOLID STATE DIV., SOMERVILLE, N.J.
Total-dose radiation-hardened CMOS integrated circuits
[AD-A067975] N79-27403

RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM (SWEDEN).
Navigation and position determination
[FOA-A-20026-E3] N79-27122
Identification of urban and rural multipath objects by means of a new measuring technique
[FOA-C-30149-E2] N79-27378
HSLAB: An interactive program for one dimensional heat flow problems
[FOA-C-20288-D6(A3)] N79-27474
Program library for handling and processing of remotely sensed multispectral data
[FOA-C-30146-E1] N79-27646
Two-thousand amp/hr primary lithiumthionylchloride cells: Test results
[FOA-C-30152-E5] N79-27710
Seismological recordings of nuclear explosions in 1976 obtained at the Hagfors observatory in Sweden
[FOA-C-20275-I1] N79-27764
Characteristics of turbulence in the atmospheric boundary layer
[FOA-VOL-12-NO-2] N79-27793
Measurements of rainfall intensity: Instrumentation and data processing
[FOA-C-30157-E2,E1] N79-27794
Shalit Perceptual Organisation and Reduction Questionnaire (SPORQ): The instrument, design, administration and scoring
[FOA-C-55021-H6] N79-27859
Activities of the Laboratory for Image Processing, 1978
[FOA-C-30159-E1] N79-27870
Backward solution of nonlinear differential equations. Part 2: Nonlinear equations with forced functions
[FOA-C-20284-E3] N79-27909
On the complexity of multivariable query evaluation
[FOA-C-20292-D8] N79-27913
Particulate radioactivity, mainly from nuclear explosions, in air and precipitation in Sweden, mid-year 1975 to mid-year 1977
[FOA-C-40089-T2(A1)] N79-27970
Thermonuclear reaction rates in a deuterium-tritium plasma
[FOA-C-20283-A2] N79-28044
Performance evaluation of a prototype relational data base handler for technical and scientific data processing
[FOA-C-20281-D8] N79-28054

RESEARCH SUPPORT INSTRUMENTS, INC., TIMONIUM, MD.
Balloon borne ultraviolet spectrometer
[AD-A067688] N79-27482

RHODE ISLAND UNIV., KINGSTON.
The identification and quantitation of UV absorbing compounds in serum by reversed-phase high performance liquid chromatography
N79-27269
The rotating hydraulics of steady flow in open channels
N79-27428
A study of the theoretical and practical determination of hydrogeological parameters in glacial outwash sands by surface geoelectrics
N79-27733

RICE UNIV., HOUSTON, TEX.
Nuclear structure at intermediate energies
[ORO-1316-201] N79-27966

RICHMOND UNIV., VA.
Laser modulation of optical absorption in ZnSe
[NASA-CR-158789] N79-27976

RISOE NATIONAL LAB., ROSKILDE (DENMARK).
Representation of inter grid sources in pseudospectral dispersion models
N79-27572

ROCHESTER UNIV., N. Y.
The effect of a moving lithospheric plate on convection in the Earth's mantle
N79-27736
Orbital interactions in molecules studied by ultraviolet photoelectron spectroscopy
N79-27939
Semiclassical theory of electronically nonadiabatic transitions in molecular collision processes
[NASA-CR-158776] N79-27944
Nuclear structure theory
[COO-2171-182] N79-27959
Theory of hole transport in rare gas solids
N79-28022
Nonlinear models in Hamiltonian dynamics and statistical mechanics
N79-28034
Rapid photometry of cataclysmic variable stars
N79-28069

ROCKWELL INTERNATIONAL CORP., ANAHEIM, CALIF.
Analysis and preliminary design of optical sensors for propulsion control
[NASA-CR-159519] N79-27975

ROCKWELL INTERNATIONAL CORP., DOWNEY, CALIF.
Erectable space platform for space sciences and applications
[NASA-CR-159091] N79-27217

ROCKWELL INTERNATIONAL CORP., EL SEGUNDO, CALIF.
Aircraft transparency failure and logistical cost analysis. Volume 1: Program summary
[AD-A068719] N79-27131

ROCKWELL INTERNATIONAL SCIENCE CENTER, THOUSAND OAKS, CALIF.
Computer controlled ESR
[AD-A068164] N79-27868

ROLLS-ROYCE LTD., DERBY (ENGLAND).
Engine performance considerations for the large subsonic transport
N79-27139
The effect of intake conditions on supersonic flutter in turbofan engines
N79-27175
Axial compressor stall
N79-27435

ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
Microstrip antenna elements for use in hemispherically scanned arrays
[AD-A068566] N79-27366

ROME UNIV. (ITALY).
Determination of NYK coupling constants by the Haber-Schaim method
[REPT-87] N79-27953
High energy behavior of pion-nucleon-scattering partial waves from amplitude analysis
[REPT-78] N79-27969

ROYAL AIR FORCE, FARNBOROUGH (ENGLAND).
Mechanics of mammalian lung
N79-27844

ROYAL AIR FORCE INST. OF AVIATION MEDICINE, FARNBOROUGH (ENGLAND).
The effect of a reclined sitting position on psychomotor performance during exposure to high, sustained +Gsub z acceleration
[FPRC-1362] N79-27856
The effect of acceleration and seat back angle on performance of a reaction time task
[FPRC-1364] N79-27857
The influence of seat back angle on acceleration tolerance
[FPRC-1365] N79-27858

ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH (ENGLAND).
A brief review of air-flight weapons
N79-27202
General weapon aerodynamics
N79-27203
Aerodynamic controls
N79-27204
Weapon/aircraft interactions
N79-27205
Weapon delivery and its evaluation
N79-27227

ROYAL GREENWICH OBSERVATORY, HERSTMONCEUX (ENGLAND).
Astronomical activities in the period October 1, 1976 to September 30, 1977
N79-28084

ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Insolation measurements in and near an industrial region of the Netherlands
[KNMI-WR-78-14] N79-27727
Estimating air pollution frequency distributions
[KNMI-WR-78-16] N79-27728
Seismological bulletin of the seismograph stations in the Netherlands, volume 59, 1971
[KNMI-108-59] N79-27765
A computer program for calculating infrared fluxes
[KNMI-WR-78-15] N79-27766
Wind trajectory models
[KNMI-WR-78-6] N79-27787
Changes in the weather: An objective approach
[KNMI-WR-78-10] N79-27788
On the calculation of large scale vertical circulation using a three parameter quasigeostrophic numerical model
[KNMI-WR-78-12] N79-27789
A comparison of surface diffusion of air pollutants over water and land (an artificial island in the North Sea)
[KNMI-WR-78-13] N79-27790
Wind and wave climate in the Netherlands sector of the North Sea between 53 deg and 54 deg north latitude
[KNMI-WR-78-9] N79-27791

Precipitation, 1977
[KNMI-117-77] N79-27795
Average winter temperatures at De Bilt [the Netherlands]: 1634 - 1977
[KNMI-V-305] N79-27796
Surface wind analysis overland in the Netherlands, based on an optimum interpolation method
[KNMI-WR-78-17] N79-27797
Experiments with iterative methods for solving the discrete Poisson equation
[KNMI-WR-79-1] N79-27914
ROYAL SIGNALS AND RADAR ESTABLISHMENT, CHRISTCHURCH [ENGLAND].
A voltage controlled active low pass filter
[RSRE-78013] N79-27417
RUTGERS - THE STATE UNIV., PISCATAWAY, N. J.
The dependence of the piezoelectric response of poly[vinylidene] [vinylidene fluoride] on phase 1 volume fraction
[AD-A067961] N79-27310

S

SANDIA LABS., ALBUQUERQUE, N. MEX.
Analysis of the potential of wind energy conversion systems
[SAND-78-2099C] N79-27668
Aerodynamic performance of the 17-metre-diameter Darrieus wind turbine
[SAND-78-1737] N79-27670
Midtemperature Solar Systems Test Facility test results: Effects of severe hailstorm on 9 August 1978
[SAND-78-2182] N79-27680
SCHWEIZERISCHE METEOROLOGISCHE ZENTRALANSTALT, ZURICH.
The catalogue of objective statistical weather forecasts for the northern Alps, the Valais, and northern and central Grisons
[SZ-ISSN-0080-7346] N79-27771
SCIENCE APPLICATIONS, INC., LA JOLLA, CALIF.
New perfluoropolymer-forming reactions
[AD-A067568] N79-27311
SCIENCE COUNCIL OF JAPAN, TOKYO.
Japan national report on space research N79-27196
SCIENTIFIC TRANSLATION SERVICE, ANN ARBOR, MICH.
Relationship between pH value and electrolyte composition of precipitation
[ANL-TRANS-1149] N79-27721
SHEFFIELD UNIV. [ENGLAND].
Combustion fundamentals N79-27278
SIEMENS A.G., BERLIN [WEST GERMANY].
Basic research into the long duration behavior of insulating materials in SF6: Insulated transmission lines.
[BMFT-FB-T-78-09] N79-27423
SIEMENS A.G., ERLANGEN [WEST GERMANY].
High pressure arcs in SF6. Part 1: Formation and velocity distribution of vapor jets at the electrodes
[BMFT-FB-T-78-03-PT-1] N79-27419
High pressure arcs in SF6. Part 2: Energy transport by radiation
[BMFT-FB-T-78-04-PT-2] N79-27420
High pressure arcs in SF6. Part 3: Influence of magnetic fields on circuit breaker arcs
[BMFT-FB-T-78-05-PT-3] N79-27421
High pressure arcs in SF6. Part 4: Field strength measurements in blown SF6-arcs
[BMFT-FB-T-78-06-PT-4] N79-27422
SIEMENS A.G., MUNICH [WEST GERMANY].
Dense transparent ferroelectric ceramics for optical applications
[BMFT-FB-T-78-17] N79-27319
SIEMENS-SCHUCKERTWERKE A.G., MUNICH [WEST GERMANY].
Video transmission with reduced information rate [picture compression]. A system with source coding for transmission of video signals for portrait videotelephone
[BMFT-FB-T-78-50] N79-27384
SIERRA CLUB, WASHINGTON, D.C.
Possible environmental effects of increased coal use in California N79-27604
SMITHSONIAN INSTITUTION, WASHINGTON, D. C.
Egypt as seen by LANDSAT N79-27626
SOCIETE NATIONALE D'ETUDE ET DE CONSTRUCTION DE MOTEURS D'AVIATION, CORBEIL [FRANCE].
Study of two heat resistant nickel alloys for turbomachine plates
[REPT-20-393] N79-27147
SOCIETE NATIONALE D'ETUDE ET DE CONSTRUCTION DE MOTEURS D'AVIATION, EVRY CEDEX [FRANCE].
The contribution of photoelasticity measurement to the study of turbine parts N79-27152
SOCIETE NATIONALE D'ETUDE ET DE CONSTRUCTION DE MOTEURS D'AVIATION, VILLAROCHE [FRANCE].
Forecasting engine life N79-27154
SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, CANNES [FRANCE].
Design concept and feasibility study of a flexible deployable, solar panel generator used on a teledetection satellite
[S-1267-CA/81-VOL-1] N79-27708
SOLAR ACTION, INC., WASHINGTON, D. C.
Citizens' solar program: State reports on barriers and strategies to renewable energy development
[HCP/U6308-01] N79-27703
SOLAR ENERGY RESEARCH INST., GOLDEN, COLO.
Storage systems analysis
[SERI/PR-35-101] N79-27705
Review of selected solar market studies and techniques
[SERI/PR-52-076] N79-28056
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY, RAPID CITY.
Solar energy system installed at Mount Rushmore National Visitor Center in Keystone, South Dakota
[NASA-CR-161238] N79-27661
SOUTHAMPTON UNIV. [ENGLAND].
A long stroke isentropic free piston hypersonic wind tunnel
[AASU-334] N79-27190
Introduction to physics of gas lasers N79-27490
SOUTHERN CALIFORNIA EDISON CO., ROSEMEAD.
Using coal inside California for electric power N79-27598
Direct firing of coal for power production N79-27612
SOUTHERN CALIFORNIA GAS CO., LOS ANGELES.
Synthetic natural gas in California: When and why N79-27615
SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
Ultrasonic pattern recognition study of intergranular stress corrosion cracks vs weld crown reflectors in SS piping
[EPRI-NP-891] N79-27297
Reliability of steam turbine rotors
[EPRI-NP-923-SY] N79-27519
Steam turbine rotor reliability: Task details
[EPRI-NP-923] N79-27520
Nondestructive testing information analysis center, 1978
[AD-A068669] N79-27525
SRI INTERNATIONAL CORP., MENLO PARK, CALIF.
Platteville heating results: HF radar observations
[AD-A068163] N79-27361
The European regional model of air pollution [EURMAP] and its application to short term episodes N79-27576
Study of pharmaceutical industrial problems
[NASA-CR-160267] N79-27852
A framework for artificial intelligence
[AD-A068188] N79-27886
STANFORD UNIV., CALIF.
Analytical and scale model research aimed at improved hangglider design N79-27081
Strike-slip faulting: Models for deformation in a non-uniform crust N79-27735
STATE UNIV. OF NEW YORK AT ALBANY.
A summary of research on the NASA-Global Atmospheric Sampling Program performed by the Atmospheric Sciences Research Center
[NASA-CR-159614] N79-27716
STATE UNIV. OF NEW YORK AT STONY BROOK.
The numerical solution of singular integral equations and applications to mixed boundary value problems of fracture mechanics N79-27529
STATENS STRAALSKYDDINSTITUT, STOCKHOLM [SWEDEN].
Production of hot water with the aid of solar energy: Conditions and costs
[SIB-R-83-1978] N79-27700
STUTTGART UNIV. [WEST GERMANY].
A general method for the layout of ailerons and elevators of gliders and motorplanes N79-27076
Room heat storage processes
[BMFT-FB-T-78-14] N79-27711
SULZER BROS. LTD., WINTERTHUR [SWITZERLAND].
Modal analysis of compressor blades by means of impulse excitation N79-27165
Acoustic silencers for inlet and exhaust of turbomachinery N79-27514
SUSSEX UNIV., BRIGHTON [ENGLAND].
An investigation of vibration dampers in gas-turbine engines N79-27164
SYNCRUDE CANADA LTD., EDMONTON [ALBERTA].
A plume dispersion study at Mildred Lake, Alberta N79-27581
SYRACUSE UNIV., N. Y.
SU[3] gauge theories of weak and electromagnetic interactions and strong interaction symmetry breaking N79-27347
Bayesian software prediction models. Volume 5: Summary of technical progress
[AD-A067690] N79-27877
The capacitance of discs of arbitrary shape
[AD-A067758] N79-27928
An environmental assessment of sewerage centralization with special reference to New York State N79-28061
SYSTEMS APPLICATIONS, INC., SAN RAFAEL, CALIF.
Development and validation of a three-dimensional wind model for air quality analysis in complex terrain N79-27551
An improved version of the reactive plume model [RPM-II] N79-27568
A consideration of measures and standards of performance of air quality simulation models N79-27589
SYSTEMS SCIENCE AND SOFTWARE, LA JOLLA, CALIF.
Extension, validation and application of the NASCAP code
[NASA-CR-159595] N79-27397
NASCAP user's manual, 1978
[NASA-CR-159417] N79-27398

T

TECHNICAL RESEARCH CENTRE OF FINLAND, ESPOO.
Optical properties of Si and Ge Schottky barrier photodectectors and light waveguides. Research with reference to optical fiber communication
[VTT-ENT-23] N79-27981
TECHNICAL UNIV. OF DENMARK, LYNGBY.
Activities of the Laboratory of Electromagnetic Theory N79-27367
TECHNISCHE HOCHSCHULE, DARMSTADT [WEST GERMANY].
Wind tunnel measurements of dynamic derivatives in the German Federal Republic
[IFD-5-78] N79-27107
Aeronautical research into vertical problems in V/STOL aircraft approach landing
[IFD-4-78] N79-27134
TECHNISCHE PHYSISCHE DIENST TNO-TH, DELFT [NETHERLANDS].
Velocity measurements using a laser Doppler velocimeter on board SS Tydeman
[TPD-1978-0-2] N79-27485
TECHNISCHE UNIV., BERLIN [WEST GERMANY].
Lee side flow field over slender delta wings of finite thickness
[ILR-23] N79-27103
Study of the theoretical to real correspondance of an optimal control model and the significance of this model for the description of working methodology with partly automated aircraft guidance and control systems
[ILR-35] N79-27184
Correlation techniques and optimum signal methods in laser optics radar systems and practical measurement technique possibilities
[ILR-33] N79-27499
TECHNISCHE UNIVERSITAET, BRUNSWICK [WEST GERMANY].
Electromagnetic induction in a conducting plate with a charged vertical finite cylinder
[GAMMA-30] N79-27757
Direct indicating proton magnetometer
[GAMMA-31] N79-27758
Development of a low drift SQUID magnetometer for geophysical applications
[GAMMA-32] N79-27759
TECHNISCHE UNIVERSITAET, MUNICH [WEST GERMANY].
Fourteenth-order harmonics from analysis of mean longitude variations of resonant satellites
[TUM-MITT-132] N79-27223
Powersat: An evaluation
[TUM-LRT-TB-22/2] N79-27707
TECHNISCHER UERBERWACHUNGS-VEREIN RHEINLAND, E.V., COLOGNE [WEST GERMANY].
Critical review of dispersion coefficients measured and applied in the Federal Republic of Germany N79-27556

TEKNEKRON, INC., BERKELEY, CALIF.
A climatology of meteorological parameters for short-range dispersion and long-range transport
N79-27577
A multi-scale dispersion model for local and regional sulfur dioxide/sulfate concentrations: Formulation and initial evaluation
N79-27578
Economic comparison of fabric filters and electrostatic precipitators for particulate control on coal-fired utility boilers
N79-27610

TEKNEKRON, INC., WALTHAM, MASS.
Compilation and analysis of data sets for the evaluation of regional sulfate models
N79-27579

TEL-AVIV UNIV. [ISRAEL].
Shock formation from discontinuities in the derivatives of solutions of nonlinear hyperbolic systems
[AD-A059201] N79-27090

TELEDYNE CAE, TOLEDO, OHIO.
Ceramic mainshaft roller bearing performance in a gas turbine engine
[AD-A067904] N79-27516

TELEDYNE CONTINENTAL MOTORS, MOBILE, ALA.
Exhaust emissions characteristics of 5 aircraft piston engines
[AD-A069012] N79-27719

TENNESSEE UNIV., KNOXVILLE.
A split finite element algorithm for the compressible Navier-Stokes equations
N79-27463

TENNESSEE VALLEY AUTHORITY, MUSCLE SHOALS, ALA.
Vertical changes in stability conditions within the first 100 meters: Tennessee Valley
N79-27596

TEXACO, INC., MONTEBELLO, CALIF.
The Texaco coal gasification process for manufacture of medium BTU gas
N79-27614

TEXAS A&M UNIV., COLLEGE STATION.
Investigation of a multiple time series model
[AD-A067770] N79-27900
Multiple time series modeling 2
[AD-A067644] N79-27901

TEXAS UNIV. AT AUSTIN.
Separably-infinite programs
[AD-A068923] N79-27882
A duality theory for a class of problems with essentially unconstrained duals
[AD-A067755] N79-27924
A bi-extremal principle for estimating efficiency frontier parameter values
[AD-A068992] N79-28046

THOMSON-CSF, MEUDON-LA-FORET [FRANCE].
Feasibility study for a satellite frequency modulated radio communication system
[ESA-CR[P]-1151-VOL-1] N79-27376
Feasibility of large orbital antennas
[DFH/DSP-032/78-VOL-2] N79-27377

TOLEDO UNIV., OHIO.
Development of opto-electronic methods for the investigation of the optical and mechanical parameters of transparent materials
N79-27974

TORONTO UNIV., DOWNSVIEW [ONTARIO].
Interferometric techniques and data evaluation methods for the utias 10 cm x 18 cm hypervelocity shock tube
[AD-A067957] N79-27187
Coupled interactions of shock-wave structure with laminar boundary layer in ionizing-argon shock-tube flows
[AD-A068869] N79-27467

TORONTO UNIV. [ONTARIO].
Material and energy balances in the production of ethanol from wood
[CONF-7806139-1] N79-27338
The design of air quality networks
N79-27580

TOULOUSE UNIV. [FRANCE].
A study of the conduction mechanisms in thin polymeric films with an application to the passivation of semiconductor components
N79-27399

TRW DEFENSE AND SPACE SYSTEMS GROUP, REDONDO BEACH, CALIF.
Monolithic microwave preamplifier
[AD-A063190] N79-27406

TRW SEMICONDUCTORS, INC., LAWNDALE, CALIF.
Monolithic 20w 2GHz transistor and monolithic 5w 4GHz transistor
[AD-A068165] N79-27408

TULSA UNIV., OKLA.
Seismic stratigraphy and basin development, Nestos Delta area, northeastern Greece
N79-27739

U

ULTRASONICS INTERNATIONAL, INC., CHURCHVILLE, PA.
Ultrasonic pattern recognition study of intergranular stress corrosion cracks vs weld crown reflectors in SS piping
[EPRI-NP-891] N79-27297

ULTRASYSTEMS, INC., IRVINE, CALIF.
Economic considerations in coverting from oil/gas firing to coal
N79-27611

UNILEVER, PLAINE SAINT-DENIS [FRANCE].
Colloid and other forces in particle adhesion and particle removal: A review
N79-27318
An algebraic expression for first-order reaction in laminar flow
N79-27470

UNILEVER RESEARCH, VLAARDINGEN [NETHERLANDS].
The influence of the forces of interaction between solids on their adhesiveness
N79-27317

UNITED STIRLING, A.B., MALMO [SWEDEN].
Prospects for heavy/medium duty automotive stirling engines
N79-27505
Development of a low cost heavy/medium duty automotive Stirling engine
N79-27506

UNITED TECHNOLOGIES CORP., SOUTH WINDSOR, CONN.
Advanced technology fuel cell program
[EPRI-EM-956] N79-27702

UNITED TECHNOLOGIES RESEARCH CENTER, EAST HARTFORD, CONN.
CARS investigations in sooting and turbulent flames
[AD-A069169] N79-27468

UNIVERSITE CATHOLIQUE DE LOUVAIN [BELGIUM].
Sensitivity of a Gaussian plume model to the vertical dispersion parameters
N79-27585

UNIVERSITY OF NORTHEAST LOUISIANA, MONROE.
Thickness of western mare basalts
[NASA-CR-158784] N79-28101

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES.
Theory of spectral radiance of pollutants at sea, volume 1
[NASA-CR-158791] N79-27633
Satellite passive remote sensing of off-shore pollutants, volume 2
[NASA-CR-158792] N79-27634

UNIVERSITY OF SOUTHWESTERN LOUISIANA, LAFAYETTE.
The specification of a decompilation methodology for data flow schema
N79-27871

UTAH UNIV., SALT LAKE CITY.
Estimation of the parameters of an autoregressive process in the presence of additive white noise
[AD-A068749] N79-27363
Light scattering studies of molecular motion in liquids
N79-27972

V

VARIAN ASSOCIATES, PALO ALTO, CALIF.
Design of automatic test equipment for developmental TWT's
[AD-A067553] N79-27404

VARTA BATTERIE A.G., KELKHEIM [WEST GERMANY].
Demands and effects of solar technology on electric power storage
[AED-CONF-78-155-047] N79-27678

VERSUCHSANSTALT FUER GEOELEKTRIK UND BLITZSCHUTZ, VIENNA [AUSTRIA].
Investigation of flow phenomena in pulverized coal gasification for the new process
[BMFT-FB-T-78-27] N79-27341

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Experiments on the stability and transition of two-dimensional and three-dimensional boundary layers with suction
[NASA-CR-157256] N79-27464

VIRGINIA STATE UNIV., PETERSBURG.
Material science and solid state physics studies with positive muon spin precession
[NASA-CR-158786] N79-28025

VIRGINIA UNIV., CHARLOTTESVILLE.
Computation of minimum noise aircraft landing trajectories
[NASA-CR-158931] N79-27929

VON KARMAN INST. FOR FLUID DYNAMICS, RHODE-SAINT-GENESE [BELGIUM].
Missile Aerodynamics, volume 1
[VKI-LECTURE-SERIES-67-VOL-1] N79-27201
Missile Aerodynamics, volume 2
[VKI-LECTURE-SERIES-67-VOL-2] N79-27211
Combustion
[VKI-LECTURE-SERIES-22] N79-27276
Unsteady Flows in Axial Flow Compressors
[VKI-LECTURE-SERIES-20] N79-27429
AGARD-VKI Short Course on Hypersonic Boundary Layers
[VKI-LECTURE-SERIES-12] N79-27437
Numerical Methods in Fluid Dynamics
[VKI-LECTURE-SERIES-44] N79-27448
Numerical methods in fluid dynamics, introductory remarks
N79-27449
High-power gas lasers, volume 1
[VKI-LECTURE-SERIES-65-VOL-1] N79-27488
High-power gas lasers, volume 2
[VKI-LECTURE-SERIES-65-VOL-2] N79-27491
High power electric discharge laser
N79-27492
Chemical lasers
N79-27493
Lasers: Their applications and operational requirements
N79-27494
Stirling Engines
[VKI-LECTURE-SERIES-53] N79-27502
Stirling engines
N79-27503
Advanced theory of the Stirling cycle digital simulation of regenerative engine operation
N79-27504
Degrees of freedom in the layout of Stirling engines
N79-27507
Unique requirements for the cooperation of computation and design in the development of Stirling engines
N79-27508
Noise in Turbomachines
[VKI-LECTURE-SERIES-81] N79-27509
Physiological fluid dynamics
[VKI-LECTURE-SERIES-32] N79-27843

VULCAN-CINCINNATI, INC., OHIO.
Methanol from coal
N79-27619

W

WARREN SPRING LAB., STEVENAGE [ENGLAND].
Dispersion from chimneys downwind of cubical buildings: A wind-tunnel study
N79-27547

WATERLOO UNIV. [ONTARIO].
A plume dispersion study at Mildred Lake, Alberta
N79-27581

WEST VIRGINIA UNIV., MORGANTOWN.
Pulsatile flow through an orifice
[PB-292194/8] N79-27475

WESTERN RESEARCH AND DEVELOPMENT, CALGARY [ALBERTA].
Bivane studies of air flow over irregular terrain
N79-27552

WESTINGHOUSE ELECTRIC CORP., PHILADELPHIA, PA.
Steam turbine rotor reliability: Task details
[EPRI-NP-923] N79-27520

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER, PITTSBURGH, PA.
Steam turbine rotor reliability: Task details
[EPRI-NP-923] N79-27520

WIEN UNIV. [AUSTRIA].
Meteorological input data for the Vienna dispersion model
N79-27593

WISCONSIN UNIV. - MADISON.
Acidity distribution on oxide surfaces
N79-27258
Roscoe user guide, version 1.1
[AD-A068864] N79-27883
Strongly stable stationary solutions in nonlinear programs
[AD-A068903] N79-27884
Analysis of finite element methods for second order boundary value problems using mesh dependent norms
[AD-A068902] N79-27903
On pointwise and analytic similarity of matrices
[AD-A068866] N79-27925
A nonlinear hyperbolic volterra equation arising in heat flow
[AD-A068898] N79-28038

Y

YALE UNIV., NEW HAVEN, CONN.
Dynamics of molecular photodissociation
N79-27940

Inclusive prompt muon and dimuon production by 28.5 GeV protons
N79-27956

Interface and electron tunneling properties of thin oxides on silicon
N79-28023

Interactions of heavy quarks in quantum chromodynamics
N79-28035

WISCONSIN UNIV. - MILWAUKEE.
Dissolution processes of aluminum oxide on tungsten, iridium, molybdenum, tantalum, and rhenium as a function of electric field strength
N79-28013

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Geology of the passive margin of New England
[PB-294473/4] N79-27768

Ray calculations of ocean sound channels using a pocket programmable calculator and extended forms of the Hirsch-Carter mathematical model with tables of the incomplete beta function
[AD-A069168] N79-27936

WORLD METEOROLOGICAL ORGANIZATION, GENEVA (SWITZERLAND).
International operations handbook for measurement of background atmospheric pollution
[WMO-491] N79-27724

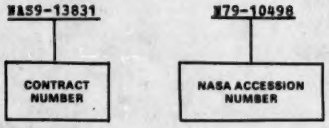
The application of atmospheric electricity concepts and methods to other parts of meteorology
[WMO-507] N79-27792

WYLE LABS., INC., HUNTSVILLE, ALA.
Indoor test for thermal performance evaluation of seven Elcam fin-tube solar collector configurations
[NASA-CR-161236] N79-27657

WYOMING UNIV., LARAMIE.
Investigation of near surface aerosol properties in arid regions
[AD-A068554] N79-27753

CONTRACT NUMBER INDEX

Typical Contract Number Index Listing



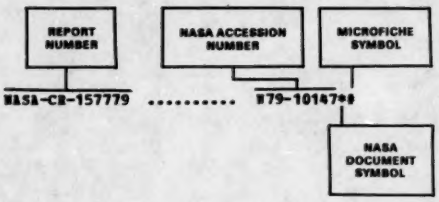
Listings in this index are arranged alphanumerically by contract number. Under each contract number the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

AF PROJ. 1227 N79-27358
AF PROJ. 2303 N79-27666
AF PROJ. 2307 N79-27187
AF PROJ. 2310 N79-27945
AF PROJ. 2403 N79-27183
AF PROJ. 2419 N79-27248
AF PROJ. 3066 N79-27881
AF PROJ. 3145 N79-27129
AF PROJ. 4005 N79-27866
AF PROJ. 4600 N79-27366
AF PROJ. 5556 N79-27362
AF PROJ. 6687 N79-27482
AF PROJ. 7371 N79-27357
AF-AFOSR-0009-78 N79-28037
AF-AFOSR-2561-73 N79-27090
AF-AFOSR-3181-77 N79-27880
AF-AFOSR-3303-77 N79-27187 N79-27467
AF-AFOSR-3644-78 N79-27247
AF-AFOSR-3673-78 N79-27898
AT(07-2)-1 N79-27559 N79-27961
A72/KL/057 N79-27853
A76/KH/016 N79-27485
DA PROJ. 1F2-62209-AH-76 N79-27145 N79-27146
DA PROJ. 1L1-61101-A-91A N79-27409
DA PROJ. 1L1-61102-AH-44 N79-27517
DA PROJ. 1L1-62111-AH-71 N79-27200
DA PROJ. 1L1-62705-AH-94 N79-27407
DA PROJ. 1T1-61101-A-91A N79-27750
DA PROJ. 1T6-65702-D-127 N79-27777 N79-27779 N79-27780
DA PROJ. 4A1-61102-AT-24 N79-27785
DA-ERO-77-G-056 N79-27121
DAAB07-77-C-0431 N79-27408
DAAB07-77-C-2703 N79-27407
DAAG29-75-C-0024 N79-27883 N79-27884 N79-27903 N79-27925 N79-28038
DAAG29-76-G-0157 N79-27591
DAAG29-77-C-0035 N79-27898
DAAG29-77-C-0048 N79-27390
DAAG29-77-G-0004 N79-28038
DAAG29-77-G-0111 N79-27365
DAAG29-78-G-0048 N79-27753
DAAJ02-75-C-0044 N79-27145 N79-27146
DACW39-78-M-2077 N79-27755
DAHC04-75-G-0095 N79-27495
DGRST-75-7-1478 N79-28032
DGRST-76-7-0782 N79-27983
DGRST-76-7-0783-PE-808 N79-27414
DI-14-34-0001-7053 N79-27816
DI-14-34-0001-7054 N79-27816
DLA900-77-C-3733 N79-27525
DOE-40-550-75 N79-27971
DOT-FA70WAI-707 N79-27352
DOT-FA72WAI-261 N79-27119 N79-27120
DOT-FA74WA-1091 N79-27719
DOT-FA75WA-3707 N79-27116
DOT-FA76WAI-622 N79-27773
DOT-FA77WA-3966 N79-27127
DOT-FA79WA-4184 N79-27117 N79-27118
DRME-75/34-278 N79-27982
DRME-75/34-329 N79-28031
DRME-76/34-143 N79-27368
DRME-76/34-252-00-480-75-01 N79-27369
E(38-1)-902 N79-27799
E(40-1)-3443 N79-27903
EC-77-A-31-1062 N79-27665
EC-77-C-02-4337 N79-27701
EF-77-C-01-2664 N79-27251
EG-77-C-01-4015 N79-27333
EG-77-C-01-4042 N79-27705
EG-77-C-01-4064 N79-27697
EG-77-G-01-4042 N79-28056
EPA-R-800397 N79-27591
EPA-68-01-1921 N79-27577 N79-27578
EPA-68-02-1293 N79-27544
EPA-68-02-1294 N79-27544
EPA-68-02-2126 N79-27342
EPRI PROJ. 68-2 N79-27411
EPRI PROJ. 364-1 N79-27330
EPRI PROJ. 502 N79-27519 N79-27520
EPRI PROJ. 553 N79-27687
EPRI PROJ. 892-1 N79-27297
ES-77-A-01-6021 N79-27998
ESA-2733/76-NL-AK(SC) N79-27415
ESA-3196/77-NL-PP(SC) N79-28082 N79-28083
ESA-3208/77-F-HGE(SC) N79-27376 N79-27377
ESA-3536/78-F-CG(SC) N79-27709
ESA-3542/78-F-CG(SC) N79-27708
ESTEC-2512/75-AK N79-27988
ESTEC-2929/76-NL-PP(SC) N79-27240
ESTEC-3315/77-NL-PP N79-27222
ESTEC-3557/78-F-HEW(SC) N79-27238
ET-76-C-03-1805 N79-27313
ET-78-C-01-2854 N79-27335
EU-78-G-01-6308 N79-27703
EV-78-C-01-6388 N79-27339
EV-78-C-01-6457 N79-28064
EV-78-C-01-6458 N79-27644
EX-76-C-01-0496 N79-27329
EX-76-C-01-2035 N79-27282
EX-76-C-01-2240 N79-27331
EX-76-C-01-2399 N79-27661
EY-76-C-02-0016 N79-27692 N79-27694 N79-27695 N79-27723 N79-27921 N79-27946 N79-27948
EY-76-C-02-1198 N79-27294
EY-76-C-02-1545 N79-27905 N79-27960
EY-76-C-02-2708 N79-27963
EY-76-C-02-2832 N79-27521
EY-76-C-02-2907 N79-27328
EY-76-C-02-2952 N79-27333
EY-76-C-02-3000 N79-28039
EY-76-C-02-4094 N79-27671 N79-27672 N79-27673 N79-27677
EY-76-C-03-3210 N79-27682
EY-76-C-04-0789 N79-27668 N79-27670 N79-27680 N79-27698 N79-27699
EY-76-C-05-0033 N79-27685
EY-76-C-05-1316 N79-27966
EY-76-C-06-1830 N79-27327 N79-27679 N79-27786
EY-76-C-07-1570 N79-27958
EY-76-C-09-0001 N79-27314 N79-27964 N79-27965
EY-76-S-02-2171 N79-27959
EY-76-S-02-2383 N79-27906 N79-27907
EY-76-S-02-2472 N79-27908
EY-76-S-06-2227-037 N79-27676
EY-78-S-02-4045 N79-27221
FAA PROJ. 154-451-014 N79-27773
FMV-FFL-82223-77-001-21-001 N79-27252
FMV-FK-82223-73-009-730906 N79-27110
FMV-FK-82223-76-002-21-001 N79-27109
F04701-75-C-0149 N79-27869
F04701-77-C-0050 N79-27866
F19628-75-C-0154 N79-27482
F19628-77-C-0053 N79-27945
F19628-78-C-0002 N79-27119 N79-27120 N79-27218 N79-27904
F30602-74-C-0152 N79-28051
F30602-75-C-0121 N79-27364
F30602-76-C-0097 N79-27877
F30602-77-C-0073 N79-27362
F30602-77-C-0222 N79-27867
F33615-73-C-3051 N79-27183

F33615-74-C-2012 N79-27156
F33615-74-C-2016 N79-27129
F33615-76-C-5124 N79-27293
F33615-76-C-5157 N79-27357
F33615-77-C-3060 N79-27131
F33615-77-C-3140 N79-27518
F33657-78-C-0156 N79-27133
F44620-76-C-0027 N79-27311
F44620-76-C-0098 N79-27666
F49620-77-C-0014 N79-27879
F49620-77-C-0102 N79-27404
F49620-78-C-0005 N79-27944
GA-MES-7712 N79-27627
JPL PROJ. 5102-115 N79-27660
JPL-955081 N79-27655
MDA903-76-C-0108 N79-28050
MIPR-AMRDL-75-5 N79-27516
NASW-2961 N79-27087
NASW-2973 N79-27192
NASW-3133 N79-27401
NASW-3198 N79-28073
NASW-3199 N79-27198
NAS1-11621 N79-27246
NAS1-14847 N79-27934
NAS1-14948 N79-27112
NAS1-15133 N79-27307
NAS1-15238 N79-27710
NAS1-15322 N79-27217
NAS1-15545 N79-27185
NAS2-2982 N79-27237
NAS3-17860 N79-27478
NAS3-20644 N79-27234
NAS3-20797 N79-27933
NAS3-21005 N79-27975
NAS3-21050 N79-27397 N79-27398
NAS4-2499 N79-27126
NAS7-100 N79-27091 N79-27193 N79-27244 N79-27321 N79-27326 N79-27597 N79-27654 N79-27658 N79-27659 N79-27660
NAS8-32036 N79-27657
NAS8-32248 N79-27656
NAS8-32570 N79-27872
NAS9-11877 N79-27815
NAS9-13000 N79-27199
NAS9-14186 N79-27323 N79-27324
NAS9-15200 N79-27348
NAS9-15409 N79-27349
NAS9-15463 N79-27852
NAS9-15543 N79-27894
NAS9-15700 N79-27232 N79-27233
NAS9-15800 N79-27875 N79-27916 N79-27917
NGL-16-001-002 N79-28065
NGL-22-009-015 N79-28109
NGL-39-009-003 N79-27744
NGR-05-002-256 N79-27743
NGR-14-005-176 N79-28074 N79-28075
NGR-22-009-339 N79-27162
NGR-47-023-001 N79-27976
NOAA-A-06-158-44054 N79-27799
NOAA-04-7-158-44104 N79-27768
NOAA-04-8-M01-149 N79-27768
NP PROJ. 01-05-01 N79-27998
NR PROJ. 047-021 N79-27882 N79-27924
NR PROJ. 051-553 N79-27868
NR PROJ. 051-616 N79-27281
NR PROJ. 064-510 N79-27534
NR PROJ. 088-076 N79-27361
NR PROJ. 098-038 N79-27468
NR PROJ. 356-564 N79-27310
NSF AST-76-80801-A-02 N79-27743
NSF ATM-76-21307 N79-27798
NSF ATM-76-22284 N79-27466
NSF ATM-78-00530 N79-27798
NSF CHE-77-27826 N79-27944
NSF ENG-74-10399 N79-27475
NSF ENG-76-05195 N79-27882
NSF ENG-78-21603 N79-27390
NSF MCS-76-06963 N79-27903
NSF MCS-78-02851 N79-27903
NSF MCS-78-09525 N79-27884
NSF OEC-76-18887 N79-27466
NSF SOC-76-15876 N79-28046
NSF 79-00272 N79-27897
NSG-1342 N79-28025
NSG-1358 N79-27464
NSG-1369 N79-28100
NSG-1388 N79-27929
NSG-1434 N79-27092
NSG-1528 N79-27633 N79-27634
NSG-1529 N79-27463
NSG-2181 N79-27125
NSG-2198 N79-27944
NSG-3138 N79-27716
NSG-3157 N79-27396
NSG-5012 N79-27350
NSG-5075 N79-27632
NSG-5224 N79-27807
NSG-5259 N79-27770
NSG-7420 N79-28101
NSG-8033 N79-28024
NSG-8062 N79-27814
NSG-8064 N79-27814
N00014-72-C-0351 N79-27180
N00014-73-C-0325 N79-27868
N00014-74-C-0079 N79-27403
N00014-75-C-0455 N79-27918
N00014-75-C-0540 N79-27310
N00014-75-C-0569 N79-27882 N79-27924 N79-28046
N00014-75-C-0571 N79-27876
N00014-75-C-0616 N79-27924 N79-28046
N00014-75-C-0805 N79-27466
N00014-75-C-0930 N79-27361
N00014-75-C-1143 N79-27468
N00014-76-C-0195 N79-27534
N00014-76-C-0225 N79-27928
N00014-76-C-0627 N79-27878
N00014-76-C-0745 N79-27281
N00014-76-C-0880 N79-27101
N00014-76-C-0932 N79-28046
N00014-76-C-1104 N79-27516
N00014-77-C-0196 N79-27936
N00014-77-C-0222 N79-27886
N00014-77-C-0645 N79-27406
N00014-78-C-0022 N79-28050
N00014-78-C-0599 N79-27900 N79-27901
N00123-74-C-0312 N79-27359
N00173-77-C-0041 N79-27363
N62269-76-M-4305 N79-27481
N66001-77-C-0139 N79-27249
N68305-78-C-0036 N79-27667
PROJ. SQUID N79-27468
RF75033 N79-27627
RF5451001 N79-27406
RR0420401 N79-27878
RR0420602 N79-28050
SRI PROJ. LSU-6910 N79-27852
SRI PROJ. 4062 N79-27361
W-31-109-ENG-38 N79-27469 N79-27674 N79-27675 N79-27693 N79-27696 N79-27720 N79-27722 N79-27808 N79-28000 N79-28063
W-7405-ENG-26 N79-27250 N79-27295 N79-27296 N79-27298 N79-27412 N79-27535 N79-27681 N79-27691 N79-27704 N79-27967 N79-27999 N79-28001 N79-28003
W-7405-ENG-36 N79-27947 N79-28002
W-7405-ENG-48 N79-27283 N79-27410 N79-27498 N79-27570 N79-27571 N79-27669 N79-27683 N79-27885 N79-27937 N79-27962 N79-28030
W-7405-ENG-82 N79-28029
XF21222091 N79-27359
XF57571001 N79-27667
146-20-10-07 N79-27717
383-85-00-00-72 N79-28102
505-02-03-01 N79-27098
505-02-23-01 N79-27070 N79-27096
505-02-41 N79-27243
505-02-54 N79-27088
505-03-13-18 N79-27931 N79-27932
505-04 N79-27142 N79-27143
505-06-31 N79-27100
505-06-41 N79-27186
505-06-43-08 N79-27094
505-08-31 N79-27241
505-09-31 N79-27136
505-10-21 N79-27436
505-10-32 N79-27182
505-11-23-03 N79-27099
506-17-23-03 N79-27245 N79-27532
506-19-13-02 N79-27237
516-50-23-01 N79-27086
516-58-21 N79-27138
517-53-13-04 N79-27772
517-53-43-02 N79-27095
644-02-00-00-72 N79-28062
791-40-43-01 N79-27097
953-36-00-00-72 N79-28045

REPORT / ACCESSION NUMBER INDEX

Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A-7117 ..... N79-27182*#
A-7666 ..... N79-27436*#
A-7733 ..... N79-27136*#
A-7753 ..... N79-27100*#
A-7849 ..... N79-27138*#
A-7868 ..... N79-27243*#
A-7877 ..... N79-27186*#
A-7891 ..... N79-27241*#

AAHU-NAS-004 ..... N79-28024*#

AASU-334 ..... N79-27190 #

AD-A059201 ..... N79-27090 #
AD-A063190 ..... N79-27406 #
AD-A067179 ..... N79-27121 #
AD-A067423 ..... N79-27102 #
AD-A067430 ..... N79-27200 #
AD-A067463 ..... N79-27667 #
AD-A067492 ..... N79-27405 #
AD-A067512 ..... N79-27495 #
AD-A067514 ..... N79-27666 #
AD-A067517 ..... N79-27998 #
AD-A067534 ..... N79-27977 #
AD-A067535 ..... N79-27358 #
AD-A067542 ..... N79-27898 #
AD-A067544 ..... N79-27248 #
AD-A067546 ..... N79-27876 #
AD-A067547 ..... N79-27357 #
AD-A067549 ..... N79-27129 #
AD-A067550 ..... N79-27183 #
AD-A067553 ..... N79-27404 #
AD-A067554 ..... N79-27879 #
AD-A067556 ..... N79-27360 #
AD-A067557 ..... N79-27751 #
AD-A067558 ..... N79-27137 #
AD-A067560 ..... N79-27524 #
AD-A067561 ..... N79-27465 #
AD-A067568 ..... N79-27311 #
AD-A067579 ..... N79-27899 #
AD-A067642 ..... N79-27481 #
AD-A067644 ..... N79-27901 #
AD-A067657 ..... N79-27146 #
AD-A067664 ..... N79-27935 #
AD-A067676 ..... N79-27777 #
AD-A067679 ..... N79-27781 #
AD-A067680 ..... N79-27783 #
AD-A067683 ..... N79-27782 #
AD-A067686 ..... N79-27780 #
AD-A067687 ..... N79-27779 #
AD-A067688 ..... N79-27482 #
AD-A067689 ..... N79-27145 #
AD-A067690 ..... N79-27877 #
AD-A067693 ..... N79-27866 #
AD-A067701 ..... N79-27750 #
AD-A067703 ..... N79-27144 #
AD-A067713 ..... N79-27867 #
AD-A067752 ..... N79-27878 #
AD-A067755 ..... N79-27924 #
AD-A067758 ..... N79-27928 #
AD-A067761 ..... N79-27778 #
AD-A067763 ..... N79-27280 #
AD-A067765 ..... N79-27188 #
AD-A067770 ..... N79-27900 #
AD-A067902 ..... N79-27101 #
AD-A067904 ..... N79-27516 #
AD-A067906 ..... N79-27359 #
AD-A067907 ..... N79-28050 #
AD-A067957 ..... N79-27187 #
AD-A067961 ..... N79-27310 #
AD-A067963 ..... N79-28027 #
AD-A067965 ..... N79-27247 #
AD-A067968 ..... N79-28037 #
AD-A067975 ..... N79-27403 #
AD-A068079 ..... N79-27496 #
AD-A068083 ..... N79-27484 #
AD-A068088 ..... N79-27352 #
AD-A068163 ..... N79-27361 #
AD-A068164 ..... N79-27868 #
AD-A068165 ..... N79-27408 #
AD-A068168 ..... N79-27483 #
AD-A068185 ..... N79-27407 #
AD-A068186 ..... N79-27902 #
AD-A068188 ..... N79-27886 #
AD-A068222 ..... N79-27755 #
AD-A068226 ..... N79-27117 #
AD-A068366 ..... N79-27978 #
AD-A068397 ..... N79-27127 #
AD-A068401 ..... N79-27118 #
AD-A068425 ..... N79-27773 #
AD-A068458 ..... N79-27293 #
AD-A068464 ..... N79-27239 #
AD-A068465 ..... N79-28028 #
AD-A068466 ..... N79-27497 #
AD-A068548 ..... N79-27365 #
AD-A068551 ..... N79-27904 #
AD-A068552 ..... N79-27312 #
AD-A068553 ..... N79-27869 #
AD-A068554 ..... N79-27753 #
AD-A068558 ..... N79-27364 #
AD-A068561 ..... N79-27133 #
AD-A068564 ..... N79-27343 #
AD-A068565 ..... N79-27119 #
AD-A068566 ..... N79-27366 #
AD-A068567 ..... N79-27534 #
AD-A068569 ..... N79-27945 #
AD-A068575 ..... N79-27220 #
AD-A068578 ..... N79-28047 #
AD-A068580 ..... N79-27754 #
AD-A068582 ..... N79-27785 #
AD-A068583 ..... N79-27132 #
AD-A068630 ..... N79-27409 #
AD-A068631 ..... N79-27533 #
AD-A068668 ..... N79-27881 #
AD-A068669 ..... N79-27525 #
AD-A068670 ..... N79-27784 #
AD-A068671 ..... N79-27918 #
AD-A068672 ..... N79-27249 #
AD-A068719 ..... N79-27131 #
AD-A068742 ..... N79-27880 #
AD-A068743 ..... N79-27466 #
AD-A068749 ..... N79-27363 #
AD-A068822 ..... N79-27130 #
AD-A068864 ..... N79-27883 #
AD-A068866 ..... N79-27925 #
AD-A068869 ..... N79-27467 #
AD-A068890 ..... N79-27362 #
AD-A068892 ..... N79-28051 #
AD-A068898 ..... N79-28038 #
AD-A068902 ..... N79-27903 #
AD-A068903 ..... N79-27884 #
AD-A068920 ..... N79-27281 #
AD-A068923 ..... N79-27882 #
AD-A068975 ..... N79-27189 #
AD-A068977 ..... N79-27517 #
AD-A068979 ..... N79-27752 #
AD-A068992 ..... N79-28046 #

AD-A069012 ..... N79-27719 #
AD-A069095 ..... N79-27218 #
AD-A069126 ..... N79-27120 #
AD-A069168 ..... N79-27936 #
AD-A069169 ..... N79-27468 #
AD-A069170 ..... N79-27518 #
AD-A069171 ..... N79-27116 #
AD-A069172 ..... N79-27219 #

AD-E000287 ..... N79-27998 #
AD-E000290 ..... N79-27496 #
AD-E400199 ..... N79-27497 #
AD-E430212 ..... N79-28028 #
AD-E430215 ..... N79-27239 #

AED-CONF-78-155-047 ..... N79-27678 #

AEDC-TR-78-14 ..... N79-27484 #
AEDC-TR-79-12 ..... N79-27102 #

AEDC-TSR-78-V49 ..... N79-27189 #

AERONONICA-ACTA-A-196-1978 ..... N79-28107

AFAL-TR-78-145 ..... N79-27358 #

AFAPL-TR-78-77 ..... N79-27129 #
AFAPL-TR-78-90 ..... N79-27881 #

AFFDL-TR-78-122-VOL-1 ..... N79-27183 #
AFFDL-TR-78-179 ..... N79-27518 #
AFFDL-TR-79-3002 ..... N79-27533 #

AFGL-TR-79-0008 ..... N79-27482 #
AFGL-TR-79-0035 ..... N79-27945 #
AFGL-TR-79-0108 ..... N79-27752 #

AFHRL-TR-78-72 ..... N79-27188 #

AFNL-TR-78-106 ..... N79-27357 #
AFNL-TR-78-173 ..... N79-27293 #
AFNL-TR-78-201-VOL-1 ..... N79-27248 #

AFOSR-79-0391TR ..... N79-27404 #
AFOSR-79-0420TR ..... N79-27879 #
AFOSR-79-0442TR ..... N79-27311 #
AFOSR-79-0472TR ..... N79-27666 #
AFOSR-79-0489TR ..... N79-27247 #
AFOSR-79-0508TR ..... N79-28037 #
AFOSR-79-0514TR ..... N79-27187 #
AFOSR-79-0540TR ..... N79-27880 #
AFOSR-79-0616TR ..... N79-27467 #

AGARD-CP-248 ..... N79-27148 #

AGARD-LS-99 ..... N79-27385 #
AGARD-LS-101 ..... N79-27225 #

AIAA-PAPER-79-0768 ..... N79-27096*#

AIAA-78-1000 ..... N79-27665*#
AIAA-79-1524 ..... N79-27930*#

AIRESEARCH-75-211682(38)-1 ..... N79-27146 #
AIRESEARCH-75-211682(38)-2 ..... N79-27145 #

ANL-TRANS-1149 ..... N79-27721 #

ANL-78-106 ..... N79-27971 #

ANL/EES-CP/22 ..... N79-27808 #
ANL/EES/TM-22 ..... N79-27720 #
ANL/SDP/TM-78-3 ..... N79-27674 #

AP-45 ..... N79-27753 #

APL/JHU/CP-065 ..... N79-27224 #

AR-5 ..... N79-27246*#
AR-1977 ..... N79-28080 #

ARBRL-MR-02902 ..... N79-28028 #

ARBRL-TR-02144 ..... N79-27239 #

ARC-TM-1071 ..... N79-27655*#

ARL-79-1 ..... N79-27092*#

ARLCD-TR-78046 ..... N79-27497 #

ARO-12963.6-P ..... N79-27495 #
AFO-14686.4-EL ..... N79-27365 #
ARO-14778.5-M ..... N79-27898 #
ARO-15119.1-GS ..... N79-27753 #

AS-PAPER-292 ..... N79-27798 #

ATC-89 ..... N79-27120 #

AVRADCOM-TR-78-49 ..... N79-27143*#
AVRADCOM-TR-79-27 ..... N79-27186*#

AWRE-0-61/78 ..... N79-27111 #

BETC/RI-78/8 ..... N79-27756 #
BETC/RI-78/19 ..... N79-27313 #

BMFT-FB-T-77-75 ..... N79-27383 #
BMFT-FB-T-78-02 ..... N79-27418 #
BMFT-FB-T-78-03-PT-1 ..... N79-27419 #
BMFT-FB-T-78-04-PT-2 ..... N79-27420 #
BMFT-FB-T-78-05-PT-3 ..... N79-27421 #
BMFT-FB-T-78-06-PT-4 ..... N79-27422 #
BMFT-FB-T-78-08 ..... N79-27729 #
BMFT-FB-T-78-09 ..... N79-27423 #
BMFT-FB-T-78-14 ..... N79-27711 #
BMFT-FB-T-78-15 ..... N79-27385 #
BMFT-FB-T-78-17 ..... N79-27319 #
BMFT-FB-T-78-18 ..... N79-27424 #
BMFT-FB-T-78-22 ..... N79-27425 #
BMFT-FB-T-78-23 ..... N79-27426 #
BMFT-FB-T-78-24 ..... N79-27427 #
BMFT-FB-T-78-27 ..... N79-27341 #
BMFT-FB-T-78-47 ..... N79-27712 #
BMFT-FB-T-78-50 ..... N79-27384 #

BNL-23597 ..... N79-27695 #
BNL-24998 ..... N79-27692 #
BNL-25216 ..... N79-27946 #
BNL-25223 ..... N79-27723 #
BNL-25378 ..... N79-27948 #
BNL-25475 ..... N79-27694 #
BNL-50892 ..... N79-27921 #

BNWL-TR-342 ..... N79-27980 #
BNWL-TR-343 ..... N79-27979 #

BR60444-VOL-1 ..... N79-27536 #
BR60445-VOL-2 ..... N79-27537 #
BR60446-VOL-3 ..... N79-27538 #
BR60447-VOL-4 ..... N79-27539 #
BR65035 ..... N79-27340 #
BR65965 ..... N79-27417 #
BR66164 ..... N79-27111 #
BR66666 ..... N79-27856 #
BR66667 ..... N79-27858 #
BR66668 ..... N79-27857 #

BULL-8 ..... N79-27761 #

CALSPAN-AK-5280-F-12 ..... N79-27183 #

CASD-LVP-78-078 ..... N79-27234*#

CCS-329 ..... N79-28046 #
CCS-330 ..... N79-27924 #
CCS-334 ..... N79-27882 #

CE-79-126 ..... N79-27632*#

CEL-CR-79.005 ..... N79-27667 #

CETIM-1-1D-01-0 ..... N79-27540 #
CETIM-1-1G-06-0 ..... N79-27541 #
CETIM-1-2J-03-0 ..... N79-27316 #

CNA-PP-249 ..... N79-27902 #

CNEXO-STR-37 ..... N79-27810 #

CNEXO-6-1978 ..... N79-27726 #

CONF-780619-22 ..... N79-27677 #
CONF-780732-5 ..... N79-27295 #
CONF-780773-1 ..... N79-27673 #

CONF-780876-5 ..... N79-28039 #
CONF-780887-1 ..... N79-27808 #
CONF-780919-4 ..... N79-27283 #
CONF-780954-2 ..... N79-28030 #
CONF-781033-33 ..... N79-27410 #
CONF-781079-4 ..... N79-27869 #
CONF-781105-86 ..... N79-28003 #
CONF-781109-25 ..... N79-27958 #
CONF-781133-5 ..... N79-27675 #
CONF-781142-5 ..... N79-27328 #
CONF-781167-5 ..... N79-27250 #
CONF-781182-2 ..... N79-28063 #
CONF-781182-3 ..... N79-27412 #
CONF-781184-1 ..... N79-27946 #
CONF-781184-3 ..... N79-27948 #
CONF-781186-2 ..... N79-27937 #
CONF-781202-27 ..... N79-27693 #
CONF-781202-31 ..... N79-27535 #
CONF-781202-32 ..... N79-27696 #
CONF-781202-36 ..... N79-28001 #
CONF-781202-38 ..... N79-27298 #
CONF-781213-3 ..... N79-27722 #
CONF-781219-6 ..... N79-27296 #
CONF-781234-1 ..... N79-28000 #
CONF-790108-1 ..... N79-27691 #
CONF-790108-3 ..... N79-27683 #
CONF-790114-1 ..... N79-27668 #
CONF-790115-1 ..... N79-27723 #
CONF-790125-1 ..... N79-28002 #
CONF-790301-2 ..... N79-28029 #
CONF-790320-1 ..... N79-27961 #
CONF-790420-5 ..... N79-27314 #
CONF-7804102-13 ..... N79-27678 #
CONF-7805105-2 ..... N79-27695 #
CONF-7805152-1 ..... N79-27332 #
CONF-7806107-2 ..... N79-27333 #
CONF-7806139-1 ..... N79-27338 #
CONF-7809112-1 ..... N79-27498 #
CONF-7809125-1 ..... N79-27327 #
CONF-7810127-1 ..... N79-27999 #
CONF-7810129-2 ..... N79-27251 #
CONF-7810139-1 ..... N79-27692 #
CONF-7810140-1 ..... N79-27885 #

COO-1198-1233 ..... N79-27294 #
COO-1545-243 ..... N79-27960 #
COO-1545-245-PT-3 ..... N79-27905 #
COO-2171-182 ..... N79-27959 #
COO-2383-0048 ..... N79-27907 #
COO-2383-0055 ..... N79-27906 #
COO-2472-04 ..... N79-27908 #
COO-2708T004-1 ..... N79-27963 #
COO-4045-3 ..... N79-27221 #
COO-4094-19 ..... N79-27677 #
COO-4094-23 ..... N79-27671 #
COO-4094-24 ..... N79-27672 #
COO-4094-28 ..... N79-27673 #
COO-4337-2/2 ..... N79-27701 #

CRC-1323 ..... N79-27355 #
CRC-1324 ..... N79-27354 #

CREARE-TN-289 ..... N79-27478*#

CRREL-79-4 ..... N79-27785 #

CSC-0286 ..... N79-27232*#
CSC-0355 ..... N79-27233*#

CTH-MATH-1978-9 ..... N79-27910 #
CTH-MATH-1978-10-1 ..... N79-27911 #
CTH-MATH-1978-10-2 ..... N79-27927 #

C79-386/501 ..... N79-27975*#

DELET-TR-77-2703-F ..... N79-27407 #
DELET-TR-79-8 ..... N79-27409 #

DFH/DSP-032/78-VOL-2 ..... N79-27377 #

DOE/CS-0052 ..... N79-27521 #
DOE/CS-0053 ..... N79-27688 #
DOE/EIA-0102/32 ..... N79-27337 #
DOE/EIA-0103/9 ..... N79-27643 #
DOE/EIA-0103/17 ..... N79-28059 #
DOE/EIA-0151 ..... N79-27684 #
DOE/ERA-0023 ..... N79-28058 #
DOE/ERA-0024 ..... N79-27336 #
DOE/ERD-0009 ..... N79-27686 #
DOE/ERD-0010 ..... N79-27690 #
DOE/ET/4064-1-VOL-2 ..... N79-27697 #
DOE/ET/28453-3 ..... N79-27676 #
DOE/JPL-1060-17 ..... N79-27660*#
DOE/JPL-1060-23 ..... N79-27658*#
DOE/NASA/1062-79/2 ..... N79-27665*#
DOE/TIC-10008 ..... N79-28064 #
DOE/TIC-10019 ..... N79-27644 #
DOE/TIC-10039 ..... N79-27339 #

DP-MS-78-80 ..... N79-27314 #
DP-MS-79-13 ..... N79-27961 #

DP-1517 ..... N79-27965 #

DPST-78-125-2 ..... N79-27964 #

DRDMI-T-79-34 ..... N79-27483 #
DRDMI-T-79-39 ..... N79-27935 #

E-028 ..... N79-27306*#
E-040 ..... N79-27236*#
E-043 ..... N79-27093*#
E-051 ..... N79-27235*#
E-057 ..... N79-27242*#
E-062 ..... N79-27140*#
E-064 ..... N79-27460*#
E-068 ..... N79-27480*#
E-075 ..... N79-27663*#
E-078 ..... N79-27351*#
E-089 ..... N79-27141*#
E-093 ..... N79-27930*#
E-095 ..... N79-27279*#
E-098 ..... N79-27461*#
E-106 ..... N79-27664*#
E-9237 ..... N79-27143*#
E-9729 ..... N79-27400*#
E-9909 ..... N79-27308*#
E-9946 ..... N79-27142*#
E-9971 ..... N79-27309*#

ECOM-DR-982 ..... N79-27779 #
ECOM-DR-983 ..... N79-27780 #
ECOM-DR-985 ..... N79-27778 #
ECOM-DR-987 ..... N79-27777 #

EMSB-79/78 ..... N79-27240 #

EPA-600/7-78-227 ..... N79-27730 #
EPA-600/7-79-016 ..... N79-27342 #

EPRI-EL-823 ..... N79-27411 #

EPRI-EM-877 ..... N79-27689 #
EPRI-EM-956 ..... N79-27702 #

EPRI-ER-808-VOL-1 ..... N79-27687 #

EPRI-FP-806-SY ..... N79-27330 #

EPRI-NP-78 ..... N79-27091*#
EPRI-NP-891 ..... N79-27297 #
EPRI-NP-923 ..... N79-27520 #
EPRI-NP-923-SY ..... N79-27519 #

ERADCOM/ASL-TR-0022 ..... N79-27200 #
ERADCOM/ASL-TR-0025 ..... N79-27750 #

ER78-4457-VOL-1 ..... N79-27869 #
ER79-4005 ..... N79-27866 #

ESA-CR(P)-1139-VOL-1 ..... N79-28082 #
ESA-CR(P)-1139-VOL-2 ..... N79-28083 #
ESA-CR(P)-1146 ..... N79-27222 #
ESA-CR(P)-1151-VOL-1 ..... N79-27376 #
ESA-CR(P)-1151-VOL-2 ..... N79-27377 #
ESA-CR(P)-1152-VOL-1 ..... N79-27708 #
ESA-CR(P)-1153-VOL-1 ..... N79-27709 #
ESA-CR(P)-1154 ..... N79-27238 #
ESA-CR(P)-1155 ..... N79-27988 #
ESA-CR(P)-1158 ..... N79-27240 #
ESA-CR(P)-1170 ..... N79-27415 #

ESA-PSS-49/TST-01-ESTEC ..... N79-27471 #

ESA-STR-202 ..... N79-27989 #

ESD-TR-79-3 ..... N79-27218 #
ESD-TR-79-31 ..... N79-27904 #

ESS/SS-814-VOL-1 ..... N79-28082 #
ESS/SS-814-VOL-2 ..... N79-28083 #
ESS/SS-909-VOL-1 ..... N79-27709 #

EUR-5911 ..... N79-27653

E79-10212 ..... N79-27629*#

FAA-EM-78-16 ..... N79-27117 #
FAA-EM-78-16-2-VOL-2 ..... N79-27118 #

FAA-NA-78-165 ..... N79-27719 #

FAA-RD-78-88 ..... N79-27719 #
FAA-RD-78-103 ..... N79-27352 #
FAA-RD-78-145 ..... N79-27773 #
FAA-RD-78-147 ..... N79-27119 #
FAA-RD-78-151 ..... N79-27120 #
FAA-RD-78-157 ..... N79-27127 #
FAA-RD-79-13 ..... N79-27116 #

FAR-3 ..... N79-27313 #

FB-36 ..... N79-28048 #

FE-0496-T8 ..... N79-27329 #
FE-2035-12 ..... N79-27282 #
FE-2240-100 ..... N79-27331 #

FERMILAB-CONF-78/82-THY ..... N79-28039 #

FFA-TN-AU-1091 ..... N79-27110 #
FFA-TN-AU-1335:2 ..... N79-27109 #

FFA-TN-HU-2054 ..... N79-27252 #

FFM-263 ..... N79-27372 #
FFM-264 ..... N79-28052 #
FFM-265 ..... N79-27373 #
FFM-267 ..... N79-27123 #

FJSRL-TR-78-0014 ..... N79-27280 #

FLOW-RR-127 ..... N79-27101 #

FOA-A-20026-E3 ..... N79-27122 #

FOA-C-20275-I1 ..... N79-27764 #
FOA-C-20281-D8 ..... N79-28054 #
FOA-C-20283-A2 ..... N79-28044 #
FOA-C-20284-E3 ..... N79-27909 #
FOA-C-20288-D6(A3) ..... N79-27474 #
FOA-C-20292-D8 ..... N79-27913 #
FOA-C-30146-E1 ..... N79-27646 #
FOA-C-30149-E2 ..... N79-27378 #
FOA-C-30152-E5 ..... N79-27710 #
FOA-C-30157-E2,E1 ..... N79-27794 #
FOA-C-30159-E1 ..... N79-27870 #
FOA-C-40089-T2(A1) ..... N79-27970 #
FOA-C-55021-H6 ..... N79-27859 #

FOA-VOL-12-NO-2 ..... N79-27793 #

FPRC-1362 ..... N79-27856 #
FPRC-1364 ..... N79-27857 #
FPRC-1365 ..... N79-27858 #

FR-2 ..... N79-27091*#
FR-14186-DRL-5 ..... N79-27324*#

FUB-11-1977 ..... N79-27926 #
FUB-16-1977 ..... N79-27985 #
FUB-17-1977 ..... N79-27374 #
FUB-21-1977 ..... N79-27986 #
FUB-22-1977 ..... N79-27987 #
FUB-24-1977 ..... N79-27375 #
FUB-42-1977 ..... N79-27912 #
FUB-43-1977 ..... N79-27382 #
FUB-44-1977 ..... N79-27124 #
FUB-45-1977 ..... N79-28055 #

GAMMA-30 ..... N79-27757 #
GAMMA-31 ..... N79-27758 #
GAMMA-32 ..... N79-27759 #

GPO-22-334 ..... N79-27322 #
GPO-32-923 ..... N79-28049 #

H-REPT-95-1530 ..... N79-28049 #

H-1092 ..... N79-27088*#

HCP/ET-2854 ..... N79-27335 #
HCP/H50081-01 ..... N79-27706 #
HCP/U6308-01 ..... N79-27703 #

HDL-TR-79-8 ..... N79-27517 #

HDL-TR-1877 ..... N79-27219 #

IAP-79-21 ..... N79-28074*#

IFD-4-78 ..... N79-27134 #
IFD-5-78 ..... N79-27107 #

IIASA-RR-78-35 ..... N79-27628

IIASA-RR-78-11 ..... N79-27627
IIASA-RR-78-11-PT-4 ..... N79-27652

ILL-(TH)-79-22 ..... N79-27897 #

ILR-23 ..... N79-27103 #
ILR-33 ..... N79-27499 #
ILR-35 ..... N79-27184 #

IM-77-FM-007-REV-A ..... N79-27873*#

INPE-1425-RPE/005 ..... N79-28089 #
INPE-1427-RPE/006 ..... N79-27749 #
INPE-1430-NTE/146 ..... N79-28117 #
INPE-1434-RPE/010 ..... N79-27747 #
INPE-1435-RPE/011 ..... N79-28088 #
INPE-1438-TDL/005 ..... N79-27776 #
INPE-1439-TDL/006 ..... N79-27642 #
INPE-1448-RPE/013 ..... N79-27402 #
INPE-1453-RPE/018 ..... N79-27895 #
INPE-1461-NTE/148 ..... N79-27356 #
INPE-1466-RPE/019 ..... N79-28087 #
INPE-1470-RPE/021 ..... N79-27641 #
INPE-1471-RPE/022 ..... N79-27997 #
INPE-1473-RPE/024 ..... N79-27325 #
INPE-1474-RPE/025 ..... N79-28076 #
INPE-1476-RPE/027 ..... N79-28026 #
INPE-1482-RPE/029 ..... N79-27746 #
INPE-1484-RPE/030 ..... N79-27745 #
INPE-1487-RPE/033 ..... N79-27774 #
INPE-1489-TDL/009 ..... N79-27874 #
INPE-1492-RPE/036 ..... N79-27920 #

INPR-1475-RPE/026 ..... N79-27353 #
INPR-1485-RPE/031 ..... N79-28108 #
INPR-1486-RPE/032 ..... N79-27775 #

IR-27 ..... N79-27329 #

IS-M-178 ..... N79-28029 #

ISBN-0-11-881269-6 ..... N79-27761 #
ISBN-0-309-02745-4 ..... N79-27963 #
ISBN-0-85518127-3 ..... N79-27111 #
ISBN-3-7696-817-11 ..... N79-27760 #
ISBN-3-7983-0597-8 ..... N79-27103 #
ISBN-3-7983-0634-6 ..... N79-27499 #
ISBN-3-7983-0640-0 ..... N79-27184 #
ISBN-87-7478-151-0 ..... N79-27809 #
ISBN-91-7056-051-X ..... N79-27793 #
ISBN-92-63-10491-3 ..... N79-27724 #
ISBN-92-63-10507-3 ..... N79-27792 #
ISBN-92-825-0179-5 ..... N79-27653
ISBN-92-835-0235-3 ..... N79-27148 #
ISBN-92-835-1322-3 ..... N79-27385 #
ISBN-92-835-1324-X ..... N79-27225 #
ISBN-951-38-0639-1 ..... N79-27981 #
ISBN-951-697-101-6 ..... N79-27769 #

ISS-L-22/9 ..... N79-27854 #

ISS-P-78/7 ..... N79-27855 #

ISS-R-78/6 ..... N79-27954 #

ISSN-0067-0340 ..... N79-27798 #
ISSN-0339-2899 ..... N79-27810 #

ISWS/CIR-133/78 ..... N79-27800 #

IEP-1978-15 ..... N79-27853 #

JPL-PUB-78-56 ..... N79-27597*#
JPL-PUB-78-57 ..... N79-27091*#
JPL-PUB-78-109 ..... N79-27658*#
JPL-PUB-79-10 ..... N79-27326*#
JPL-PUB-79-28 ..... N79-27321*#
JPL-PUB-79-35-VOL-2 ..... N79-27659*#
JPL-PUB-79-39 ..... N79-27660*#
JPL-PUB-79-45 ..... N79-27193*#
JPL-PUB-79-47 ..... N79-27244*#
JPL-PUB-79-58 ..... N79-27654*#

JPL-9950-104 ..... N79-27655*#

JPRS-73729 ..... N79-27860 #
JPRS-73784 ..... N79-27817 #

JSC-12866-REV-A ..... N79-27873*#
JSC-14782 ..... N79-27629*#
JSC-14812 ..... N79-27232*#
JSC-14832 ..... N79-28062*#
JSC-14859 ..... N79-27916*#
JSC-14864 ..... N79-28102*#
JSC-14870 ..... N79-27917*#
JSC-14871 ..... N79-27875*#
JSC-14902 ..... N79-28045*#

KNMI-V-305 ..... N79-27796 #

KNMI-WR-78-6 ..... N79-27787 #
KNMI-WR-78-9 ..... N79-27791 #
KNMI-WR-78-10 ..... N79-27788 #
KNMI-WR-78-12 ..... N79-27789 #
KNMI-WR-78-13 ..... N79-27790 #
KNMI-WR-78-14 ..... N79-27727 #
KNMI-WR-78-15 ..... N79-27766 #
KNMI-WR-78-16 ..... N79-27728 #
KNMI-WR-78-17 ..... N79-27797 #
KNMI-WR-79-1 ..... N79-27914 #

KNMI-108-59 ..... N79-27765 #
KNMI-117-77 ..... N79-27795 #

KU-RZ-9/1977 ..... N79-27104 #
KU-RZ-10/1977 ..... N79-27105 #
KU-RZ-12/1977 ..... N79-27106 #

L-11623 ..... N79-27098*#
L-12299 ..... N79-27237*#
L-12973 ..... N79-27070*#
L-12993 ..... N79-27099*#

LA-UR-79-101 ..... N79-28002 #
LA-UR-79-241 ..... N79-27947 #

LBF-FR-138 ..... N79-27526 #

LBF-TR-137 ..... N79-27919 #

LBL-7957 ..... N79-27410 #
LBL-7996 ..... N79-28030 #
LBL-8090 ..... N79-27498 #
LBL-8335 ..... N79-27937 #
LBL-8429 ..... N79-27283 #
LBL-8583 ..... N79-27683 #

LC-78-52310 ..... N79-27963 #

LCBS-20 ..... N79-27713 #

LCR-77-32/R/G.5 ..... N79-27983 #
LCR-494-292 ..... N79-27982 #
LCR-494-305 ..... N79-27368 #
LCR-1437/77 ..... N79-28032 #
LCR-2251-DK-PT-1 ..... N79-28031 #
LCR-2270-DK ..... N79-27414 #
LCR-14077 ..... N79-27369 #

LEC-13344 ..... N79-27916*#
LEC-13353 ..... N79-27875*#
LEC-13355 ..... N79-27917*#

LPS-78-1 ..... N79-27380 #
LPS-78-2 ..... N79-28111 #
LPS-78-3 ..... N79-27762 #
LPS-78-6 ..... N79-27381 #

LR-28869 ..... N79-27116 #

M-24-6-678 ..... N79-27249 #

MCR-TSR-1906 ..... N79-28038 #
MCR-TSR-1928 ..... N79-27925 #

MDC-E1879 ..... N79-27815*#

MDC-G8027 ..... N79-27872*#

MIMEOGRAPH-SER-79-6 ..... N79-27918 #

MITT-25 ..... N79-27620 #

MMS-1218 ..... N79-27898 #

MPI-PAE/EXTRATERR-142 ..... N79-27968 #
MPI-PAE/EXTRATERR-143 ..... N79-27486 #
MPI-PAE/EXTRATERR-144 ..... N79-27949 #
MPI-PAE/EXTRATERR-145 ..... N79-27984 #

MPIS-3/1978 ..... N79-28005 #
MPIS-5/1978 ..... N79-27950 #
MPIS-6/1978 ..... N79-28040 #
MPIS-7/1978 ..... N79-27951 #
MPIS-8/1978 ..... N79-27285 #
MPIS-10/1978 ..... N79-27286 #
MPIS-11/1978 ..... N79-27108 #
MPIS-12/1978 ..... N79-27287 #
MPIS-13/1978 ..... N79-27952 #
MPIS-22/1978 ..... N79-27288 #

MRC-TSR-1919 ..... N79-27903 #
MRC-TSR-1920 ..... N79-27884 #
MRC-TSR-1930 ..... N79-27883 #

MSC-07652-REV-B ..... N79-27199*#

MTR-7904-VOL-1 ..... N79-27117 #
MTR-7904-VOL-2 ..... N79-27118 #

NA-78-604-VOL-1 ..... N79-27131 #

NADC-76278-30 ..... N79-27481 #

NASA-CASE-FRC-11014-1 ..... N79-27395*#

NASA-CASE-GSC-12223-1 ..... N79-27864*#
NASA-CASE-GSC-12360-1 ..... N79-27394*#

NASA-CASE-KSC-11065-1 ..... N79-27865*#
NASA-CASE-KSC-11076-1 ..... N79-27479*#

NASA-CASE-MSC-18334-1 ..... N79-27348*#

NASA-CASE-NPO-13910-1 ..... N79-27836*

NASA-CR-2085 ..... N79-27070*#
NASA-CR-3133 ..... N79-27307*#
NASA-CR-3161 ..... N79-27934*#
NASA-CR-134781 ..... N79-27478*#
NASA-CR-144882 ..... N79-27126*#
NASA-CR-157256 ..... N79-27864*#
NASA-CR-157444 ..... N79-27192*#
NASA-CR-158718 ..... N79-27743*#
NASA-CR-158729 ..... N79-27655*#
NASA-CR-158760 ..... N79-27234*#
NASA-CR-158761 ..... N79-27770*#
NASA-CR-158762 ..... N79-27744*#
NASA-CR-158763 ..... N79-28024*#
NASA-CR-158764 ..... N79-27396*#
NASA-CR-158765 ..... N79-27807*#
NASA-CR-158766 ..... N79-27632*#
NASA-CR-158767 ..... N79-27244*#
NASA-CR-158768 ..... N79-27660*#
NASA-CR-158769 ..... N79-27659*#
NASA-CR-158770 ..... N79-27597*#
NASA-CR-158771 ..... N79-27193*#
NASA-CR-158772 ..... N79-27658*#
NASA-CR-158773 ..... N79-27321*#
NASA-CR-158774 ..... N79-27654*#
NASA-CR-158775 ..... N79-27091*#
NASA-CR-158776 ..... N79-27944*#
NASA-CR-158777 ..... N79-27814*#
NASA-CR-158778 ..... N79-27125*#
NASA-CR-158779 ..... N79-27401*#
NASA-CR-158780 ..... N79-28074*#

NASA-CR-158781 ..... N79-28075*#
NASA-CR-158782 ..... N79-28065*#
NASA-CR-158783 ..... N79-28100*#
NASA-CR-158784 ..... N79-28101*#
NASA-CR-158785 ..... N79-27350*#
NASA-CR-158786 ..... N79-28025*#
NASA-CR-158787 ..... N79-27092*#
NASA-CR-158788 ..... N79-27326*#
NASA-CR-158789 ..... N79-27976*#
NASA-CR-158791 ..... N79-27633*#
NASA-CR-158792 ..... N79-27634*#
NASA-CR-158914 ..... N79-27112*#
NASA-CR-158931 ..... N79-27929*#
NASA-CR-159050 ..... N79-27087*#
NASA-CR-159071 ..... N79-27246*#
NASA-CR-159075 ..... N79-27185*#
NASA-CR-159076 ..... N79-27718*#
NASA-CR-159091 ..... N79-27217*#
NASA-CR-159417 ..... N79-27398*#
NASA-CR-159519 ..... N79-27975*#
NASA-CR-159595 ..... N79-27397*#
NASA-CR-159614 ..... N79-27716*#
NASA-CR-159628 ..... N79-27933*#
NASA-CR-160239 ..... N79-27875*#
NASA-CR-160251 ..... N79-27232*#
NASA-CR-160252 ..... N79-27233*#
NASA-CR-160257 ..... N79-27199*#
NASA-CR-160261 ..... N79-27916*#
NASA-CR-160263 ..... N79-27917*#
NASA-CR-160266 ..... N79-27894*#
NASA-CR-160267 ..... N79-27852*#
NASA-CR-160271 ..... N79-27349*#
NASA-CR-160272 ..... N79-27323*#
NASA-CR-160273 ..... N79-27324*#
NASA-CR-160274 ..... N79-27815*#
NASA-CR-161230 ..... N79-27656*#
NASA-CR-161236 ..... N79-27657*#
NASA-CR-161238 ..... N79-27661*#
NASA-CR-161255 ..... N79-27872*#

NASA-EP-131 ..... N79-28096*#
NASA-EP-145 ..... N79-27089*#

NASA-NEWS-RELEASE-79-86 ..... N79-28094*

NASA-RP-1025 ..... N79-27237*#
NASA-RP-1041 ..... N79-28062*#

NASA-SP-221(03) ..... N79-27531*#
NASA-SP-7037(110) N79-27068*
NASA-SP-7043(21) N79-27647*

NASA-TM-58213 ..... N79-28102*#
NASA-TM-58219 ..... N79-28045*#
NASA-TM-72865 ..... N79-27088*#
NASA-TM-75479 ..... N79-27198*#
NASA-TM-75480 ..... N79-28073*#
NASA-TM-78227-VOL-1 ..... N79-27630*#
NASA-TM-78227-VOL-2 ..... N79-27631*#
NASA-TM-78230 ..... N79-27662*#
NASA-TM-78232 ..... N79-27515*#
NASA-TM-78303 ..... N79-27500*#
NASA-TM-78541 ..... N79-27436*#
NASA-TM-78559 ..... N79-27136*#
NASA-TM-78566 ..... N79-27100*#
NASA-TM-78597 ..... N79-27243*#
NASA-TM-78600 ..... N79-27186*#
NASA-TM-78604 ..... N79-27241*#
NASA-TM-78606 ..... N79-27138*#
NASA-TM-79165 ..... N79-27306*#
NASA-TM-79173 ..... N79-27480*#
NASA-TM-79175 ..... N79-27236*#
NASA-TM-79176 ..... N79-27093*#
NASA-TM-79184 ..... N79-27235*#
NASA-TM-79188 ..... N79-27242*#
NASA-TM-79192 ..... N79-27460*#
NASA-TM-79196 ..... N79-27140*#
NASA-TM-79197 ..... N79-27663*#
NASA-TM-79198 ..... N79-27351*#
NASA-TM-79204 ..... N79-27141*#
NASA-TM-79208 ..... N79-27930*#
NASA-TM-79210 ..... N79-27279*#
NASA-TM-79212 ..... N79-27461*#
NASA-TM-79213 ..... N79-27665*#
NASA-TM-79216 ..... N79-27664*#
NASA-TM-79628 ..... N79-28109*#
NASA-TM-79691 ..... N79-27748*#
NASA-TM-80045 ..... N79-27772*#
NASA-TM-80072 ..... N79-27094*#
NASA-TM-80073 ..... N79-27532*#
NASA-TM-80083 ..... N79-27095*#
NASA-TM-80091 ..... N79-27462*#
NASA-TM-80092 ..... N79-27098*#
NASA-TM-80097 ..... N79-27099*#
NASA-TM-80105 ..... N79-27096*#
NASA-TM-80109 ..... N79-27931*#
NASA-TM-80111 ..... N79-27717*#
NASA-TM-80112 ..... N79-27097*#
NASA-TM-80118 ..... N79-27932*#
NASA-TM-80121 ..... N79-27245*#
NASA-TM-80127 ..... N79-27086*#
NASA-TM-80272 ..... N79-27638*#
NASA-TM-80276 ..... N79-28110*#
NASA-TM-80277 ..... N79-27635*#
NASA-TM-80278 ..... N79-27640*#
NASA-TM-80281 ..... N79-28091*#
NASA-TM-80284 ..... N79-28115*#
NASA-TM-80287 ..... N79-28103*#
NASA-TM-80288 ..... N79-28104*#
NASA-TM-80290 ..... N79-28114*#
NASA-TM-80291 ..... N79-27639*#
NASA-TM-80293 ..... N79-27637*#
NASA-TM-80294 ..... N79-28092*#
NASA-TM-80295 ..... N79-27636*#
NASA-TM-80298 ..... N79-28077*#
NASA-TM-80299 ..... N79-28078*#
NASA-TM-80304 ..... N79-28116*#
NASA-TM-80306 ..... N79-28090*#
NASA-TM-80339 ..... N79-28066*#
NASA-TM-80446 ..... N79-27629*#
NASA-TM-80478 ..... N79-27806*#
NASA-TM-80479 ..... N79-27873*#

NASA-TP-1485 ..... N79-27400*#
NASA-TP-1489 ..... N79-27308*#
NASA-TP-1490 ..... N79-27309*#
NASA-TP-1491 ..... N79-27142*#
NASA-TP-1493 ..... N79-27143*#
NASA-TP-1494 ..... N79-27182*#

NASA-TT-F-679 ..... N79-27501*#

NAVSEA-MT-100 ..... N79-27249 #

NBS-TN-993 ..... N79-27990 #

NBSIR-78-1558 ..... N79-28027 #

NEL-656 ..... N79-27473 #
NEL-657 ..... N79-28042 #
NEL-658 ..... N79-28043 #

NLR-TR-77005-U ..... N79-27135 #

NOAA-TM-EDIS-NGSDC-4 ..... N79-27767 #

NOAA-TR-NMFS-SSRF-727 ..... N79-27811 #

NOAA-79030205 ..... N79-27799 #
NOAA-79031602 ..... N79-27767 #
NOAA-79031603 ..... N79-27768 #
NOAA-79031612 ..... N79-27811 #

NOSC/TD-219 ..... N79-27343 #
NOSC/TR-208-ADD-1 ..... N79-27359 #
NOSC/TR-390 ..... N79-27978 #
NOSC/TR-395 ..... N79-27249 #

NP-23641 ..... N79-27334 #

NPL-CHEM-86 ..... N79-27289 #
NPL-CHEM-95 ..... N79-27290 #

NPL-DNACS-88 ..... N79-28053 #

NPS55-79-02 ..... N79-27132 #
NPS67-78-005 ..... N79-27144 #

NRL-MR-3638 ..... N79-27998 #

NRL-3976 ..... N79-27220 #
NRL-3977 ..... N79-27754 #
NRL-8273 ..... N79-27496 #

NSF/ENG-74-10399-D ..... N79-27475 #

NSWC/DL-TR-3822 ..... N79-27312 #
NSWC/WOL/TR-78-91 ..... N79-27977 #

NUREG-CR-0577 ..... N79-27962 #
NUREG-CR-0653 ..... N79-27971 #

ONRL-C-1-79 ..... N79-27405 #

ORAU/IEA(O)-79-3 ..... N79-27685 #

ORNL/CON-36 ..... N79-27704 #
ORNL/TM-6715 ..... N79-27681 #

ORO-1316-201 ..... N79-27966 #

OUEL-1258/78 ..... N79-27542 #
OUEL-1260/78 ..... N79-27191 #
OUEL-1264/78 ..... N79-27379 #
OUEL-1273/78 ..... N79-27472 #

OWRT-A-095-MO(1) ..... N79-27816 #

P/539/77/20 ..... N79-27284 #
P/539/77/24 ..... N79-27413 #
P/539/77/26 ..... N79-27315 #

PAR-007-79 ..... N79-27127 #

PB-292194/8 ..... N79-27475 #
PB-292245/8 ..... N79-27990 #
PB-292328/2 ..... N79-27342 #
PB-292712/7 ..... N79-27800 #
PB-293017/0 ..... N79-27798 #
PB-293160/8 ..... N79-27730 #
PB-293183/0 ..... N79-27816 #
PB-293271/3 ..... N79-27224 #
PB-293437/0 ..... N79-27713 #
PB-293662/3 ..... N79-27971 #
PB-293734/0 ..... N79-27799 #
PB-294215/9 ..... N79-27811 #
PB-294439/5 ..... N79-27767 #
PB-294473/4 ..... N79-27768 #

PERME-TR-44 ..... N79-27340 #

PMTC-TP-79-09 ..... N79-27784 #

PNL-MA-572-APP ..... N79-27679 #

PNL-2878 ..... N79-27786 #

PR-353 ..... N79-28007 #
PR-400 ..... N79-28041 #
PR-415 ..... N79-27763 #
PR-427 ..... N79-28093 #
PR-432 ..... N79-28105 #
PR-433 ..... N79-27197 #

PRRL-78-CR-44 ..... N79-27403 #

PSU-IRL-SAR-79/1 ..... N79-27744*#

PUBL-SER-B-FASC-2 ..... N79-28081 #

P79-10088 ..... N79-28094*

QR-6 ..... N79-27408 #

RADC-TR-78-155-VOL-5 ..... N79-27877 #
RADC-TR-78-160 ..... N79-27364 #
RADC-TR-79-5 ..... N79-27867 #
RADC-TR-79-30 ..... N79-28051 #
RADC-TR-79-43 ..... N79-27366 #
RADC-TR-79-44 ..... N79-27362 #

RE-577 ..... N79-27128 #

REPT-5-78 ..... N79-27370 #
REPT-6-78 ..... N79-27371 #
REPT-7-78 ..... N79-27922 #
REPT-20-393 ..... N79-27147 #
REPT-72/78/91-ISSUE-2 ..... N79-27415 #
REPT-73 ..... N79-27894*#
REPT-78 ..... N79-27969 #
REPT-78-112 ..... N79-28006 #
REPT-79-FM-13 ..... N79-27629*#
REPT-79-2 ..... N79-27534 #
REPT-87 ..... N79-27953 #
REPT-103 ..... N79-27543 #
REPT-709-02-CR ..... N79-27192*#
REPT-805.109 ..... N79-27485 #

REPT-1014 ..... N79-27645 #
REPT-1713-01-5-1902 ..... N79-27133 #
REPT-7610.909 ..... N79-27522 #
REPT-7610.910 ..... N79-27523 #

RLO/2227/T37-3 ..... N79-27676 #

RP-AI-0239 ..... N79-27238 #

RR-79-1 ..... N79-27878 #

RSL-221 ..... N79-28097 #

RSRE-78013 ..... N79-27417 #

R7906-8 ..... N79-27349*#

S-REPT-96-258 ..... N79-28057 #

S-490 ..... N79-28062*#
S-1267-CA/81-VOL-1 ..... N79-27708 #

S/T-MEMO-1/77-VOL-1 ..... N79-27536 #
S/T-MEMO-1/77-VOL-2 ..... N79-27537 #
S/T-MEMO-1/77-VOL-3 ..... N79-27538 #
S/T-MEMO-1/77-VOL-4 ..... N79-27539 #

SAMSO-TR-79-27 ..... N79-27866 #

SAND-78-1737 ..... N79-27670 #
SAND-78-2099C ..... N79-27668 #
SAND-78-2182 ..... N79-27680 #
SAND-78-7024 ..... N79-27699 #
SAND-78-7045 ..... N79-27682 #
SAND-79-7001 ..... N79-27698 #

SASR-1 ..... N79-27744*#

SCIENTIFIC-2 ..... N79-27945 #

SC549.31FR ..... N79-27868 #

SEL-2 ..... N79-27880 #

SER-A-87 ..... N79-27760 #

SER-B-199-MITT-143 ..... N79-28079 #
SER-B-222-MITT-146 ..... N79-28085 #

SERI/PR-35-101 ..... N79-27705 #
SERI/PR-52-076 ..... N79-28056 #

SIB-R-83-1978 ..... N79-27700 #

SQUID-UTRC-5-PU ..... N79-27468 #

SR-4 ..... N79-27515*#

SSS-R-78-3739 ..... N79-27398*#
SSS-R-79-3904 ..... N79-27397*#

SWRI-15-4823 ..... N79-27525 #

SZ-ISSN-0080-7346 ..... N79-27771 #

TCAE-1623 ..... N79-27516 #

TDB-312 ..... N79-27416 #

TDCK-70084 ..... N79-27853 #
TDCK-70751 ..... N79-27485 #

TM/ES/79-05 ..... N79-28059 #

TN-162 ..... N79-27792 #
TN-1979-3 ..... N79-27218 #
TN-1979-22 ..... N79-27904 #

TPD-1978-0-2 ..... N79-27485 #

TR-N-1 ..... N79-27901 #
TR-N-4 ..... N79-27900 #

TR-1 ..... N79-28050 #
TR-10 ..... N79-27928 #
TR-14 ..... N79-27310 #
TR-15-SER-C ..... N79-27466 #
TR-17 ..... N79-27769 #
TR-43 ..... N79-27361 #

TR-78-5 ..... N79-27877 #
TR-79-3 ..... N79-27928 #
TR-007 ..... N79-27876 #
TR-688 ..... N79-27880 #
TR-1441 ..... N79-27125*#

TT-75-52090 ..... N79-27501*#

TUR-LRT-TB-22/2 ..... N79-27707 #

TUR-NITT-132 ..... N79-27223 #

UAG-66 ..... N79-28106

UCB/GT-78-05 ..... N79-27755 #

UCID-18051 ..... N79-27669 #

UCLA-CNTR-1-1 ..... N79-27666 #

UCRL-52632 ..... N79-27962 #
UCRL-81067 ..... N79-27885 #

UDR-TR-78-54 ..... N79-27293 #

UIEM-79-6 ..... N79-27365 #

UILU-ENG-78-1723 ..... N79-27907 #
UILU-ENG-78-1738 ..... N79-27906 #
UILU-ENG-79-2546 ..... N79-27365 #

UIUCDCS-R-78-931 ..... N79-27907 #
UIUCDCS-R-78-946 ..... N79-27906 #

ULRP-400/CAR ..... N79-27945 #

UNC/SG-78/2 ..... N79-27799 #
UNC/SG-78/09 ..... N79-27799 #

UR-671 ..... N79-27959 #

US-PATENT-APPL-SN-041143 ..... N79-27864*#
US-PATENT-APPL-SN-041164 ..... N79-27394*#
US-PATENT-APPL-SN-051270 ..... N79-27348*#
US-PATENT-APPL-SN-051271 ..... N79-27865*#
US-PATENT-APPL-SN-051274 ..... N79-27479*#
US-PATENT-APPL-SN-053652 ..... N79-27395*#
US-PATENT-APPL-SN-712270 ..... N79-27836*

US-PATENT-CLASS-128-329R N79-27836*
US-PATENT-CLASS-128-639 ..... N79-27836*

US-PATENT-4,154,228 ..... N79-27836*

USAAVRADCOM-TR-79-16 ..... N79-27130 #

USARTL-TR-78-55A ..... N79-27146 #
USARTL-TR-78-55B-VOL-2 ..... N79-27145 #

UTEC-CSC-79-021 ..... N79-27363 #

UTIAS-TN-208 ..... N79-27187 #

UTIAS-233 ..... N79-27467 #

VKI-LECTURE-SERIES-12 ..... N79-27437 #
VKI-LECTURE-SERIES-20 ..... N79-27429 #
VKI-LECTURE-SERIES-22 ..... N79-27276 #
VKI-LECTURE-SERIES-32 ..... N79-27843 #
VKI-LECTURE-SERIES-44 ..... N79-27448 #
VKI-LECTURE-SERIES-53 ..... N79-27502 #
VKI-LECTURE-SERIES-65-VOL-1 ..... N79-27488 #
VKI-LECTURE-SERIES-65-VOL-2 ..... N79-27491 #
VKI-LECTURE-SERIES-67-VOL-1 ..... N79-27201 #
VKI-LECTURE-SERIES-67-VOL-2 ..... N79-27211 #
VKI-LECTURE-SERIES-81 ..... N79-27509 #

VTT-ENT-23 ..... N79-27981 #

WES-HPGL-79-3 ..... N79-27755 #

WGRC-78-4873 ..... N79-27192*#

WHOI-78-65 ..... N79-27936 #
WHOI-79-27 ..... N79-27768 #

WHO-491 ..... N79-27724 #
WHO-507 ..... N79-27792 #

WILE-TR-531-29 ..... N79-27657*#

W79-05001 ..... N79-27816 #

Y/OWI/TR-36/20 ..... N79-27967 #

☆U.S. GOVERNMENT PRINTING OFFICE: 1979-281-439/18

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to eleven special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley

COLORADO
University of Colorado, Boulder

DISTRICT OF COLUMBIA
Library of Congress

GEORGIA
Georgia Institute of Technology, Atlanta

ILLINOIS
The John Crerar Library, Chicago

MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge

MISSOURI
Linda Hall Library, Kansas City

NEW YORK
Columbia University, New York

OKLAHOMA
University of Oklahoma, Bizzell Library

PENNSYLVANIA
Carnegie Library of Pittsburgh

WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library

COLORADO
Denver Public Library

CONNECTICUT
Hartford Public Library

MARYLAND
Enoch Pratt Free Library, Baltimore

MASSACHUSETTS
Boston Public Library

MICHIGAN
Detroit Public Library

MINNESOTA
Minneapolis Public Library

MISSOURI
Kansas City Public Library
St. Louis Public Library

NEW JERSEY
Trenton Public Library

NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library

OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library

TENNESSEE
Memphis Public Library

TEXAS
Dallas Public Library
Fort Worth Public Library

WASHINGTON
Seattle Public Library

WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESA - Information Retrieval Service, European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

National Aeronautics and
Space Administration

Washington, D.C.
20546

Official Business
Penalty for Private Use, $300

SPECIAL FOURTH CLASS MAIL
Book

Postage and Fees Paid
National Aeronautics and
Space Administration
NASA-451

POSTMASTER: **If undeliverable (Section 158 Postal Manual) Do Not Return**